

CREATIVE TEACHING

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

BY

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*To Those Who Are Striving
To Teach Purposefully and Creatively*

EDITOR'S INTRODUCTION

It is only during the last decade or two that modernly conceived industrial arts education has outgrown the "manual training" and "manual arts" stages of development. Within the same span of time vocational education has grown from a minor to a major phase of public education. In both areas of learning higher professional standards for teachers have been set. The higher professional standards, in turn, are made possible largely by improvements in what has become known about the art and science of teaching.

This book has been prepared as an aid to prospective teachers, to teachers in service, and to students of education. It represents an integration of the results of experiences in secondary schools with young people and adults interpreted in the light of philosophy of education, refinements in the art of teaching, and advances made in the sciences of education.

The units of instruction in this book have been tested with many groups of teachers in service and with students of industrial arts and vocational industrial education in several well-known teacher-training institutions. The author has had many years of experience as a teacher, supervisor, and administrator of practical arts and vocational education. It is the Editor's belief that the book has balance, is comprehensive, and authoritative. It should serve as a source of inspiration to teachers and be a means of furthering *purposeful* and *creative* learning in the practical arts and in vocational education.

J. C. WRIGHT
Editor

PREFACE

This book is addressed to prospective teachers and to teachers in service who are striving toward professional goals not yet realized, and toward standards not yet attained. It is written for thinking men and women in many walks of life who are interested in mastering the principles, procedures, and techniques of practical arts and vocational education as a means of continuous growth.

The book is written for teachers of industrial arts and vocational industrial education because it is my conviction that the fundamental principles, methods, and procedures of teaching industrial arts are essentially the same as those employed in good vocational industrial education. Adaptations must, of course, be made to each field.

I believe, furthermore, that there is so much in common between the principles and techniques of teaching the various forms of the practical arts and of vocational education that many chapters of this book have a direct bearing upon good teaching in such fields as home economics, agricultural education, instruction for the distributive trades, municipal training, and commercial education.

Certain portions of this book may appeal to students majoring in, or largely concerned with, general education because the viewpoints expressed in this volume may supplement those found in the literature dealing primarily with "academic" education. Neither practical arts, vocational education, nor general education are water-tight compartments of learning that are to be separated from one another. *Democratically conceived education* must come to grips with all important phases of life and must spring from an integration of all these areas of learning.

Since methods and techniques of teaching are ways and means of guiding purposeful thought and constructive work, the book begins with a consideration of the larger goals or objectives that

help to orient and determine specific ways and means of learning and teaching.

In the effort to develop specific skills, knowledges, and appreciations, useful as they are, we must not lose sight of the broader, fundamental goals of education toward which all education, including practical arts and vocational education, must contribute.

Creative work calls for discriminating thinking, wide reading, thoughtful planning, and critical evaluation of results. It is suggested that students be encouraged to read thoughtfully and extensively. Many references have been indicated through footnotes and at the end of each chapter. Collateral reading should be supplemented by direct observation, and through visual-sensory aids. Learning through doing will always be one of the most effective methods of developing the masteries desired.

Resourcefulness can be developed in many ways not here enumerated other than to say that students can be encouraged to contribute to, rather than merely to give evidence of being familiar with, what has been assigned.

Adjustment and growth are by no means limited to youth. This book seeks to emphasize that learning is, or can be made, a life-long, joyous, creative experience and that appropriate methods and techniques of learning and teaching are means toward that end.

Acknowledgments are due my co-workers with whom professional problems have been discussed, from time to time. Acknowledgments are also due supervisors, directors, and administrative officers in many places, and especially the teachers in service and students, undergraduate and graduate, with whom it has been my privilege to work.

I wish also to thank contemporary writers whose contributions I have tried to recognize, in so far as possible, through footnote and other references, and those who have furnished photographs for illustrative purposes. I owe a special debt of gratitude to my wife, Alice Clark Struck, for making many helpful editorial suggestions and for generously assuming more than her share of family responsibilities while this book was being written.

F. T. S.

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CREATIVE TEACHING INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

CHAPTER I

GUIDING GOALS AND BASIC CONCEPTS

IF METHODS ARE TO BE EFFECTIVE, THERE MUST BE A
CLEAR CONCEPT OF PURPOSES

1. **A socially conceived philosophy.** In industrial education, today, there is needed—probably more than anything else—a clear, comprehensive outlook on the fundamental purposes and the meanings of what is being done, and what should be undertaken in this area of education. Progress in industrial education will be made in proportion to the clarity and the worth-whileness of goals or outcomes toward which we strive. It will be affected by the social soundness of the guiding principles that will be followed, and by the breadth of the horizons that shall be brought to bear upon the task of industrial education.

Just as one's philosophy of life is the outgrowth of careful, mature consideration of human living, so likewise one's philosophy of industrial education comes through serious reflection and analytical thinking in terms of the basic meanings of such forms of education. At heart one's philosophy of life, of education, or of industrial education focuses in well-founded ideals and faiths. The philosophy of industrial education, which is so basic to an intelligent consideration of methods and techniques of teaching, may be thought of as *a growing and evolving group of carefully evaluated ideals, values, or goals. Out of, and in close harmony with them, will emerge guiding principles, valid standards, and effective methods and techniques of teaching.*

A social philosophy of life holds that our economic system shall

a monument, erected to the memory of Governor Bradford, carries an inscription which in essence is as follows: "Do not hastily cast aside that for which the Pilgrim fathers strove so valiantly." Flexibility and adaptability are biologically and educationally fundamental to progress but thoughtless, groundless change may be little more than another delusion.

4. **Progressive teaching.** A progressive industrial teacher is one who is "going places." He is one who is not satisfied with present achievements; he is striving toward goals not yet realized. The progressive teacher thinks in terms of what lies before him. The unprogressive teacher is like the fire-flies that let their "tails" illuminate the past without casting their light on that which lies ahead.

The progressive teacher knows that what is best today may not be so tomorrow. He is sure that change is the law of life and that there must be no set patterns for all schools or all individuals to follow. *The progressive industrial teacher does not fiddle while "Rome" burns.* A few more or less objective evidences of a successful teacher are herewith enumerated:

- (1) He keeps up on current events—especially on those that have a bearing on what he teaches.
- (2) His shop rates high in pupil activity.
- (3) The atmosphere of his shop is natural, congenial, and democratic. He is its recognized leader but not its despotic ruler.
- (4) He participates in community affairs—particularly in scout, hobby, craft, or athletic affairs in which his pupils have interests.
- (5) He keeps up-to-date through professional reading, school journeys, conferences, and teacher-improvement courses.
- (6) His interests are broad and he associates with those who are not content to rest upon such past achievement as may be theirs.
- (7) He makes all the contacts possible with community enterprises, with industrial establishments, and with parents.
- (8) He gives evidence of professional growth through contributions that will improve educational practices locally and elsewhere.

The creed of the progressive teacher calls for mastery rather than docile submission to fate. He believes, as did Thomas A. Edison, that "Success is due 98 per cent to perspiration and 2

per cent to inspiration," or as Thomas Briggs has put it: "Nothing worth while will miraculously come without careful planning and arduous work." *Progressive teaching* makes suitable adaptation to local requirements; it displays discretion in the selection of subject matter and shows ingenuity in meeting new problems.

5. **Toward an evolving culture.** Socially conceived industrial education seeks to do more than adapt individuals to their environment; it strives to undertake more than adjusting them to a constantly changing mode of life—it aims to prepare them, each in his own way, and within the limits of his capacities, to contribute to a growing, evolving culture. Individuals must not only "bear their own weight" in the struggle of life; they must not only sustain and perpetuate that which has proved valuable to our civilization, but they should go beyond this when possible. They should strive to add to and make life better than it has been.

Industrial teachers contribute to an evolving culture through giving individuals an appreciative understanding of man's struggle for existence. In order to contribute to an evolving culture the instruction in industrial education may be better in one or more of several ways than it has been in that school heretofore. It may be better in its social-economic insights; it may be superior in thought content; it may have gained in quality of hand skills or in other ways that make for better teaching and improved learning.

6. **Education the cornerstone.** Many great leaders of thought and of world affairs agree that the hope of a better society lies in education. Newton D. Baker puts it as follows: "The founders of this nation regarded education as a sacred duty. It was started in this country as a part of the sacred ministry of religion, and it has been fortified and handed over to you no less sacred a task than it was in those ministerial hands. . . . no man can be a student of the birth, growth and development of our free institutions without realizing that *from the beginning the cornerstone of American liberty and development has been education.*"¹

Herbert S. Weet says, "Say what you will about the short-

¹ Newton D. Baker, "Youth Challenges the Nation," *N.E.A. Journal*, Vol. 23, No. 6, October, 1934.

comings of the public schools, it has given well-nigh unparalleled returns on its investment."²

Glenn Frank gives a slightly different emphasis to the same central thought in the following words: "The school is at once society's organ of conservation and its organ of criticism. It must conserve the golden heart of the great traditions in which the race distills the wisdom of the centuries and gives expression to the truth mankind has hammered out on the anvil of experience. But the schools must also blaze trails into the future."³

Dewey says: "I believe that education is the fundamental method of social progress and reform."⁴ Champlin puts it in the following manner: "It is education alone that can create a worthy social democracy and a world of cooperative countries."⁵

Such statements as these, attesting to the important place that education has in our well-being and progress, have been put tersely and well in the following manner: "*The school is an agency created by society for the purpose of recreating society.*" As life has become increasingly complex, as it has stepped up its tempo, and as an increasingly larger burden of educational responsibility has been delegated to the schools, it will be seen that industrial arts and vocational industrial education must broaden their goals, and must quicken their adjustments, in order that they too, shall contribute significantly toward the broader objectives of the democratic program of education of which they are a part.

7. **The broader objectives.** Methods of instruction are merely ways of procedure of aiding or guiding the thinking, the behavior, and the emotional experiences of those who want to learn. Within recent years fast-changing social and economic conditions have thrown an added challenge to those who would do their bit to improve our social order. America believes firmly in education, but our concept of the function of education, our

² See "Report of Minneapolis Convention," *N.E.A. Journal*, p. 106.

³ Glenn Frank, "Education and the Social Welfare," Address before N.E.A., Department of Superintendence, St. Louis, Mo., Feb. 23, 1930.

⁴ John Dewey, "My Pedagogic Creed," *N.E.A. Journal*, December, 1929, and January, 1933.

⁵ C. D. Champlin, "Education Rebuilding Our Social Order," *School and Society*, Vol. 42, November, 1933, pp. 709-10.

underlying philosophy of what education should try to accomplish, and the ways and means through which it should be done, these must measure up to America's vital life needs or education itself will become meaningless, impotent, and useless.

Education, for our day and generation, must come to grips with the realities of life; education is not an end to be achieved but a means toward ends. Better and happier living, individually or in terms of the larger social order, can come only through better adjustment to the changing social and economic conditions of our time. Therefore one of the important, controlling purposes of education must be adaptation to a fast-changing environment. Such adaptation does not imply a weak, vacillating readiness to change from the tried and tested to any new unchallenged theory or mode of procedure. It does, however, carry the implication that there should be open-mindedness and readiness to want to learn, to modify, and to change when these will make for improvement. The open frankness with which the coming generation looks upon many traditional and conventional procedures is a move in the right direction. Biologically, adjustment means adaptation to environmental conditions; educationally, adjustment means adaptation to this fast-moving, coostantly changing world in which we live.

8. Social-economic goals of the N.E.A. As an aid to a constructive, personal philosophy of education which will serve as a basis for specific methods and techniques of instruction, in the area of industrial education, it will be well to examine the ten social-economic goals of America that were set up by a committee of eminent educators appointed by the National Education Association.* Although a detailed consideration of these goals is not contemplated for our present purpose, it shall be our aim to see how these objectives apply to industrial education. They are given in the order in which they were listed by the Committee.

(1) *Hereditary strength.* In amplification of this topic the Committee states, "The development of rich personalities depends upon the innate strengths and capacities of individuals." Reflective thinking will indicate that both industrial arts and

*N.E.A., "Restating Our National Goals," *Journal of the National Education Association*, Vol. 23, No. 1, January, 1931.

vocational industrial education have contributions to make toward perpetuating hereditary strength. Both contribute, each in its own way, toward wholesome, creative, happy family life. Shorter working hours in the factory should not mean less work for individuals. Through energizing home-crafts, through club and recreational activities, industrial education makes directly



FIG. 1. Industrial arts is for persons of all ages. Here we have a view of an art metal shop—one of the very popular departments of the Milwaukee, Wisconsin, Vocational School. Notice the range of age in members of the class. The tool panels in the rear of the room show how tools are kept in an orderly and readily accessible manner.

for thought-provoking, healthful, and socially essential patterns of life; through skills, knowledges, and habits that function effectively vocationally, trade and industrial education is at the very foundation of happy home life and of security of the state and of the nation.

(2) *Physical security.* The report states, "To be born with superior innate capacities is but half the picture; to have these capacities conserved and developed is the other half." Physical security is a composite of many factors. It represents an ideal toward which successive generations and individuals strive with

varying success. It is clear, however, that familiarity with tools, materials, and processes of labor assists man in his mastery of his physical environment. An understanding of safety practices and habit formation in safety procedures are helpful, in this fast-moving machine age, toward giving certain essential kinds of controls over accident hazards.

From another point of view physical security is certainly greater when men follow the pursuits of peace than of war. The schools stand for amity among peoples rather than for strife. Industrial education is chiefly directed toward increasing the physical security of individuals through providing suitable food, clothing, shelter, and utensils, all of which are essential to physical security.

(3) *Participating in an evolving culture.* The committee has well pointed out that "Society must assure each individual the fullest possible opportunity to come into fruitful contact with culture." In supplementing item 5 of this chapter, it may be pointed out that one of the major objectives of industrial education is to give individuals an appreciative understanding of the world's work and of its major activities. True culture is not to be confused with a superficial familiarity with an outgrown yesterday, but springs from the creative work of a people even as it did in the reigns of the Athenian leader Pericles and of Queen Elizabeth of England. It is conceivable that it may be as cultural to plow a straight furrow, to caress a bumped forehead, to build a sky-scraper, to work in a factory, or to labor creatively in the varying aspects of the arts and crafts as it is to memorize what a past generation interpreted as culture.

Participation in an evolving culture calls for ability to do as well as ability to think. Industrial education is clearly the means of developing desirable work habits in the pre-employment age, as well as the means of re-directing and supplementing those of adults.

(4) *An active, flexible personality.* For the last several decades one of the major emphases in education has been upon giving adequate recognition to the development of resourcefulness, initiative, and flexibility in individuals. The Committee's conviction that an active, flexible personality is essential is well taken.

To quote: "Traits that are distinctive and unique are not only the sources of one's own keenest satisfactions, but also the ultimate source of fruitful social change." Progress in and through education must come through variability and change rather than to slavish adherence to past practice. Under item 3 of this chapter it has been mentioned that flexibility is basic to a progressive philosophy of life and education. There are large areas of learning that are appropriately devoted to developing individual traits and personal special interests and capacities. Many of these are in the realm of the practical arts. An individual may be quite average in most of his interests and abilities but he may become renowned through some special personal gift or some unusually dynamic drive inspired by interest in a realm of endeavor that varies from the usual. Education, today, comes far from providing adequately for the differentiations in interests and capacities that are needed in a fast-moving world. But practical arts and vocational education offer rich, unrealized opportunities to assist individuals to find their points of greatest strength, of maximal social usefulness, and of personal happiness.

(5) Suitable occupation. Some years ago, America's foremost educational philosopher wrote: "An occupation is the only thing which balances the distinctive capacity of an individual with his social service. To find out what one is fitted to do and to secure the opportunity to do it is the key to happiness."¹ Practical arts education concentrates on the task of finding out for what a person is best fitted; vocational education which follows gives that body of pre-employment training that enables one to secure and to hold the work for which one is best fitted, or it supplies the knowledge and skill that will enable one to adapt himself to the changed conditions that science, invention, discovery, and management have brought about.

The Committee reports: "A congenial life-work is a first requisite of a rich personality." What a challenge to industrial education! Methods of teaching when dominated by such motivating ideals and when sanely selected for their purpose become effective procedures, the value of which lies beyond accurate estimate. Sug-

¹ John Dewey, *Democracy and Education*, New York, The Macmillan Co., 1921, p. 270 (Used by special permission of the publisher)

gestions as to how this objective may be realized are reserved for a later part of this book.

(6) *Economic security.* On this topic the report is one that strikes straight from the shoulder. It says, "The devices and agencies currently employed to confer economic security are wholly inadequate." In view of the world-wide economic and political unrest that prevails today, one can see that there is urgent need for considering this important phase of life. It is believed that we are warranted in the faith that the schools, in cooperation with other agencies of government, can increase economic security. Such security is not obtained through grouped, ineffective individuals, but may be expected to emerge as a result of higher standards of public service, less narrowly conceived self-seeking—particularly by those who are blinded by an inordinate lust for power—and wise selection for, and effective preparation in, various vocational pursuits.

Attitudes and ideals are important factors in economic security. There is good ground for believing that in industrial education certain important intangibles, such as attitudes and ideals that have valuable life bearings, deserve more attention in the school shop and classroom than they are, as a rule, now getting.

The engineering and teaching professions now employ the majority of the professional workers in America. With high school enrollments on the increase and with the professions crowded, it appears that economic security for youth lies largely in the areas of business, industry, homemaking, and farming. Economic security without a calling at which one can make an honest living is an absurdity.

(7) *Mental security.* The group whose task it was to re-state our social-economic aims thinks that "Just as society has brought pure drinking water to the houses and the highways, so it ought to bring pure truth within our reach at every point and on every matter where non-social agencies are interested in hood-winking us." Industrial education has largely to do with experience as opposed to precept; it tends to develop a problem-solving, inquiring attitude of mind. To the extent that such a mental attitude discourages the spread of false theories, it makes for mental security. But viewed in a different light, mental health is also

a factor in mental security. That interesting, creative work is restful to weary nerves is well known; that the possession of vocational skill gives one a sense of mental security quite impossible to those not vocationally competent is likewise common knowledge; that the pursuit of craft, club, and other avocational activities add interest, zest, and a feeling of optimism and security to our existence can be attested to by many.

(8) *Equality of opportunity.* Industrial education has come into being as an organized school activity as a result of widespread belief that equality of opportunity cannot be had through "academic" instruction alone. Equality of educational opportunity has been interpreted too narrowly by some. "But equality as a social principle means equality of rights and opportunities," says the report of the N.E.A. Committee. That is, all individuals should have the right to develop their interests and capacities in line with the best interests of the group; but it is quite obvious that individual differences in interests, effort, and capacity will take a free hand in what individuals will do and how they will do it. Equality of opportunity must not imply that identity of training is the desired goal—far from it. Our philosophy of the junior high school, of practical arts, and of vocational education is clearly in opposition to such a literal interpretation.

Briggs has called attention to the fact that one of the current conflicts in secondary education has to do with whether or not we shall have a common curriculum for all. He states that, "The approved theory clearly indicates that far more differentiation than is now common, or under present conditions possible, will be necessary to achieve commonly desirable goals with heterogeneous youth."^{*}

(9) *Freedom.* Freedom has always meant much to us. For it the early pioneers faced the hazards of an expansive ocean, of unknown rigors, of absence from friends and loved ones, of the many comforts that the older civilization had to offer. In recent years many peoples in numerous parts of the world have had serious constrictions placed upon their freedom. Small wonder, then, that our Committee asks for freedom of speech, of the

^{*}Thomas H. Briggs, "Issues in Secondary Education," *N.E.A. Journal*, Vol. 25, No. 4, 1936, p. 106

mine both the content and the methods of instruction. One cannot assume that because one is successful in teaching vocational classes on a pre-employment level that equal success is certain with employed adults. It is also conceivable that one may be more successful with certain adult groups than with others.

In view of the fact that the entrance age for vocational employment is being raised it would appear that the school will be

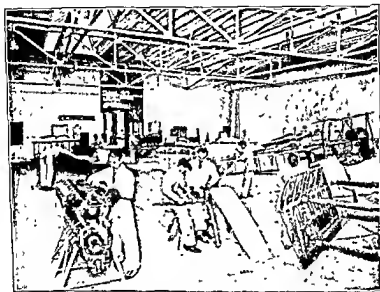


FIG. 2. A vocational aeronautical mechanics class at work in the George Washington High School, Los Angeles, California.

able to broaden the curriculum content for those attending full-time vocational schools. A more fundamental knowledge of essential economic theory and of the social sciences is suggested for inclusion in curriculums. Likewise a more intimate knowledge of modern industries and of present-day occupations is greatly needed.

In the light of such and other worthy objectives, such as those proposed by the Committee of the N.E.A., which have been referred to in this chapter, it is clear that vocational industrial

Third. So rapid and extensive are the changes in occupations and the corresponding changes in the equipment workers need that the procession of demands on them seems to be continually passing by while they stand still.

Fourth. If workers do not keep up with the procession they meet with lowered wage, reduced employment, and loss of occupation; and the further they lag behind, the sooner they join the unemployable group or become a part of the social scrap heap.

Fifth. The only agency we know, which can help them keep up-to-date with the occupational equipment in skill and knowledge they need, is some form of vocational training.

Sixth. Only an adequate system of public vocational education will meet the needs of prospective and of employed workers in the various occupations.

Seventh. All the trends in the conditions affecting the matter emphasize the interstate and national character of the problems of vocational education in the States.

15. Integration. "When specialization was put into practice," writes Irwin, "some teachers lost sight of the child and centered the work upon subject matter. It then seemed necessary to integrate or correlate the work of the different teachers in some way so that the school should be an integral part of the child's life rather than a place where knowledges and skills alone were developed."¹⁸ Teachers of industrial education, like individuals in business and in industry, readily see the need for correlating and integrating their efforts. To illustrate, there is the teacher of shop-work, who, recognizing his own limitations as a designer and artist, cooperates with the art teacher with the result that the shop projects are artistically attractive as well as structurally strong. Or, take the case of the shop teacher who helps to motivate the instruction in the English department by suggesting to the teacher of English that the pupils be called upon to write about their observation and experiences in the school shops and manufacturing plants. There are many ways that can be found to integrate instruction. Integration appears to be relatively easy to bring about in industrial arts taught in the elementary grades, but when they are given on the junior and senior high school level, and in trade and industrial education, there are greater obstacles; but integration represents a worthy ideal that will be realized increasingly as teachers learn the effective procedures.

¹⁸ Manley E. Irwin, *Educational Method*, Vol. XV, No. 3, January, 1935 pp. 191-97.

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CHAPTER II

ADAPTING INSTRUCTION TO INDIVIDUAL NEEDS

LEARNING IS ALWAYS AN INDIVIDUAL MATTER

Individual differences have been observed in people from earliest times. That such differences are great is likewise well known. But it is only within relatively recent years that something has been done about it in an organized way in educational practice. Adapting instruction to individual needs has become more than a shibboleth or a slogan. Since one cannot well think of teaching as having been done, unless learning has taken place, and since learning is an individual matter requiring individual effort, it can readily be deducted that good teaching calls for a rather accurate understanding of individual differences.

1. **Causes of individual differences.** Thorndike discusses the causes of individual differences under five main heads.¹ These are:

1. Sex
2. Race or remote ancestry
3. Family or near ancestry
4. Maturity
5. Environment

It would take a volume or more to discuss each of these causes fully. There will be no effort here to add to the extant literature on this subject other than to point out a few of the sources of further information and to discuss briefly those aspects that seem particularly pertinent to efficiency in industrial education.

2. **Evidences of adolescence.** Adolescence is defined by Hollingworth as "that period of life that lies between childhood and adulthood."² In terms of years this represents the "teen-age"

¹ Edward L. Thorndike, *Educational Psychology*, Vol. III, New York, Teachers College, Columbia University, 1914, pp. 109-315.

² Leta S. Hollingworth, *The Psychology of the Adolescent*, New York, D. Appleton-Century Co., 1928, p. 1.

embracing approximately the seven years prior to maturity. Various names are commonly applied to this period of development, such as: "awkward age," "silly age," and "the age when boys feel their oats but do not yet possess the stability of manhood." Among the evidences of adolescence are changes of voice—more evident in boys than girls; changes in size and shape, and in emotional behavior.

We are all more or less aware of the physical, mental, and emotional changes that come with adolescence. Teachers, parents, social workers, law enforcement officers, and others will not only want to understand the educational, the psychological, and the social significance of the changes that come so dramatically into the lives of adolescents, but they want to be able to anticipate them and to guide youth to view such changes in a matter-of-fact way. This can be done by giving suitable explanations, from time to time, beginning preferably in the home long before adolescence takes place. In this way it is hoped that the coming generation may be spared many of the ill effects of the prudery to which the older generations have been heir. It is encouraging, for example, to see the greater frankness with which municipalities and states are discussing the social and economic implications of the so-called "social diseases" with a view toward greatly reducing their ravages through sane education.

Adolescents, in their groping climb toward maturity, give evidence of such traits as the following:

1. Cock-sureness, self-assertion, and an attitude of possessing insight and knowledge beyond their years.
2. Responsiveness to social recognition and approval, particularly of their own age group.
3. Pugnacity and love of physical strife—more obvious in boys than in girls.
4. Attraction toward persons of approximately their own age, of the opposite sex.
5. The desire to do what others of their set are doing.
6. Group activity such as scouting, school orchestra, and participation in club activities as opposed to individual activities.
7. Bullying, teasing, or annoying others.
8. Interest in exchange of ideas, debate, and argumentation.
9. Interest in mystery, adventure, and romance.

in favor of, and, in other instances, against, certain vocational pursuits. How much is traceable to family ancestry and how much to environment has not yet been determined.

6. Maturity. One must distinguish between chronological age and maturity for, as has already been mentioned, climate and race affect the rate of maturation so that a child of twelve is "older" for its years in tropic than in northern countries. Hollingworth uses the term *maturation* for the changes that take place in human beings which are "due to heredity plus innumerable and subtle environmental factors of the nature of which we know little."⁸ He differentiates these from changes that are due to *training* which represents the interaction of heredity with factors that we can know and measure more accurately.

The view-point is expressed by Jordan that it is impossible to get an accurate measure of the effect of maturity on individual differences.⁹ He believes that the effects of sex, race, and maturity as causes for individual differences are small when compared with the influence of family or near ancestry.

The present trend to discourage children from skipping grades and to substitute differentiated curriculums so that all will work with their best efforts is based on the belief that there are distinct advantages in keeping children with those of approximately the same maturity rather than grouping them solely on the basis of mental age.¹⁰

7. Environment. In discussing the effects of heredity and environment upon intelligence or upon individual differences, the term "nature" is often applied to that which is innate, and "nurture" to that which is acquired otherwise. There are rather strongly differing points of view concerning the effect of nature and nurture on intelligence. Terman believes that intelligence is essentially an original or inborn trait that is affected but little by environment. Bagley and others disagree with this belief.¹¹

⁸ H. L. Hollingworth, *Educational Psychology*, New York, D. Appleton-Century Co., 1933, pp. 108-9.

⁹ A. M. Jordan, *Educational Psychology*, New York, Henry Holt & Co., 1928, pp. 303-7.

¹⁰ J. L. Thompson, "Chronological Age Does Count," *Journal of Education*, 115: 661-4, December, 1932.

¹¹ Monroe, DeVoss, and Reagan, *op. cit.*, pp. 252-62.

Nature and nurture may well be regarded as two essential correlative factors, which must interact. Without a reasonably good inheritance an individual's ability to learn is narrowly restricted; but, similarly, when environmental conditions are extremely unfavorable the strictures placed upon growth and life itself become insurmountable.

It is a commonplace that environment, owing to the advances of science and manufacture, is much less restricted than it was in the days of the bootjack and ox-team. In these days, transportation, communication, the radio, the press, all powerfully influence rural as well as urban life. Out-of-school education fostered in this way helps to break down old customs and racial and provincial habits. The sense of speed gained from exposure to American urban life is communicable to those who live lives of greater calm. When modern psychological tests are given to people like the American Indian, to whom speed means less than it does to whites, it is found that contact with white men's civilization tends to speed them up. Thus the scores made in psychological tests show up higher, not necessarily because of increased ability or aptitude but because they tried harder to do more in the time allotted.

Unsatisfactory environmental conditions, such as strained home relationships, broken homes, undesirable neighborhoods, and apathy on the part of parents toward education, may develop attitudes and habits in pupils that are difficult to correct. Nor are these influences limited to children. The attitudes and outlook that adults develop, quite unconsciously but with certainty, as the by-product of environmental conditions, are potent factors in molding their future. Distrust and suspicion, bred of previous out-of-school, or even in-school, experiences may thus be a temporary barrier between the teacher and an adult, or between him and a pupil in the all-day school.

8. **Breaking with tradition.** For several decades, says Wood, we have been giving "lip service" to individualizing education, but "the prescriptive curriculum, with its correlative uniform mass standards, still reigns supreme and almost unchanged. Most educational resources, procedures, and efforts are still organized around, and directed toward, a predetermined pattern of subjects

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⁹ A. M. Jordan, *Educational Psychology*, New York, Henry Holt & Co., 1928, pp. 363-7.

¹⁰ J. L. Thompson, "Chronological Age Does Count," *Journal of Education*, 115 661-4, December, 1932.

¹¹ Monroe, DeVoss, and Reagan, *op. cit.*, pp. 252-62.

Nature and nurture may well be regarded as two essential correlative factors, which must interact. Without a reasonably good inheritance an individual's ability to learn is narrowly restricted; but, similarly, when environmental conditions are extremely unfavorable the strictures placed upon growth and life itself become insurmountable.

It is a commonplace that environment, owing to the advances of science and manufacture, is much less restricted than it was in the days of the bootjack and ox-team. In these days, transportation, communication, the radio, the press, all powerfully influence rural as well as urban life. Out-of-school education fostered in this way helps to break down old customs and racial and provincial habits. The sense of speed gained from exposure to American urban life is communicable to those who live lives of greater calm. When modern psychological tests are given to people like the American Indian, to whom speed means less than it does to whites, it is found that contact with white men's civilization tends to speed them up. Thus the scores made in psychological tests show up higher, not necessarily because of increased ability or aptitude but because they tried harder to do more in the time allotted.

Unsatisfactory environmental conditions, such as strained home relationships, broken homes, undesirable neighborhoods, and apathy on the part of parents toward education, may develop attitudes and habits in pupils that are difficult to correct. Nor are these influences limited to children. The attitudes and outlook that adults develop, quite unconsciously but with certainty, as the by-product of environmental conditions, are potent factors in molding their future. Distrust and suspicion, bred of previous out-of-school, or even in-school, experiences may thus be a temporary barrier between the teacher and an adult, or between him and a pupil in the all-day school.

8. **Breaking with tradition.** For several decades, says Wood, we have been giving "lip service" to individualizing education, but "the prescriptive curriculum, with its correlative uniform mass standards, still reigns supreme and almost unchanged. Most educational resources, procedures, and efforts are still organized around, and directed toward, a predetermined pattern of subjects

prescribed by committees whose members appear to be oblivious of the fact and the implications of individual differences."¹² This challenging indictment of secondary education, as a whole, deserves our serious consideration. To what extent does it hold (a) for industrial arts education, and (b) for vocational industrial education? Is it possible that much needs to be done in industrial as well as in academic education to adapt instruction so that all individuals may grow in knowledge, skill, and appreciations as they should?

Another educator of prominence, Trabue, thinks along somewhat similar lines.¹³ He points out that we all accept the basic theory of individual differences, that we are ready to prove the great range that exists in them, but that we continue along the old beaten pathways. He says: "Why pretend to be neutral and train for academic purposes solely? . . . One of the most difficult teacher attitudes to change is that which looks upon occupations requiring strong academic ability as superior in social dignity and general desirability to those requiring high mechanical skills or great physical strength." This he says is unfair, undemocratic, and anti-social.

The context in the preceding paragraph is clearly directed to teachers and school officials rather exclusively occupied with, and interested in, general education. Attention is called to it because it is a true, frank statement of a situation that is guiding many young people away from industrial and other forms of practical arts and vocational education into pursuits that in many instances will be less happy for them. There is indeed distinct danger in over-intellectualized, inactive education.

9. Implications of individual differences. The fundamental motive for securing a rich background of understanding and appreciation of individual differences is that it will serve as a foundation upon which effective pupil guidance and good teaching can be built. As in medicine and engineering, so also in education, diagnosis is the first approach on the basis of which procedures are then selected. To be a good diagnostician means

¹² Ben D. Wood, "Criteria of Individualized Education," *Occupations*, Vol. 14, No. 8, May, 1938, pp. 781-6 (Used by special permission of the publisher.)

¹³ M. R. Trabue, "Occupational Diagnosis for Educational Programs," *Journal of Educational Research*, Vol. 29, January, 1938, pp. 327-31.

much. Many automobile mechanics can do the work required after someone has diagnosed the trouble, but it takes the expert to locate it. There are implications in this for teachers. Pupil diagnosis is sometimes delayed too long, or if made is rendered very superficially. Every evidence of unusual behavior on the part of pupils should be an incentive to determine its cause and meaning, for in education as in medicine the emphasis should be on diagnosing conditions *before* they become serious problems.



FIG. 3. An industrial arts electric shop in one of the Philadelphia junior high schools. Every pupil gets a variety of try-out and exploratory experiences in this shop.

Teachers may learn about individual differences in pupils in a variety of ways. Keen observation of and sensitiveness toward differences are necessities. The way other individuals act toward the person under consideration is one source of information. The opinions of those with whom the individual comes in contact will frequently serve as a lead. So also will his special interests or lack of them. First-hand knowledge of the individual's home conditions, of his out-of-school environment, of his reading interests, play preferences, and the opinions of other teachers all may throw light upon an individual's unusual behavior and upon his variations from the normal.

Through case-study techniques, where the aim is to get as much information as possible about a given individual, and where the diagnostician is more concerned with the exceptional than with the typical, the teacher can arrive at data, which, if rightly interpreted and used by him, will lay the ground-work for truly individualized instruction. Among the factors that shed light on case-studies, Crawford finds the following important:¹⁴

TABLE II

FACTORS TO BE CONSIDERED IN CASE-STUDIES OF INDIVIDUALS

- | | |
|-------------------------------|-----------------------------------|
| (1) Physical condition | (6) Past history |
| (2) Hereditary background | (7) Present activities |
| (3) Mental condition | (8) Home conditions |
| (4) Emotional characteristics | (9) Social contacts ¹⁵ |
| (5) School record | |

Individual differences are often the source of one's most pronounced achievements, fullest self-realization, and greatest social usefulness. They are the evidences that distinguish individuals one from another. If it be true that democratically conceived education stands for the fullest possible development and happiness for everyone, then the recognition of individual differences and individualization of instruction is at once a thrilling challenge and a major responsibility for teachers.

10. **Meaning of individualization.** The term "individualization" is a broader, more comprehensive term than "individual instruction." Individual instruction has distinct limitations as well as pronounced advantages. Thus under the Winnetka and other plans, employing individual instruction extensively, there is also provided opportunity for group activity and socialization. Courtis prefers to think of individualization "not as a device, a method, or an achievement, but an evolving ideal."¹⁶ His is the following definition: "Individualization as a method of teaching or as a philosophy of education refers primarily to the attempt to adjust education to the nature of the individual, not to the development of individualistic, anti-social ideals." Creative participation in the

¹⁴ Claude C. Crawford, *The Technique of Research*, Los Angeles, University of Southern California, 1923, Chapter 5.

¹⁵ See also, S. L. Pressey, *Psychology of the New Education*, New York and London, Harper and Brothers, 1933, pp. 251-57.

¹⁶ S. A. Courtis, "The Evolution of Individualization," *Educational Method*, Vol 15, No. 6, March, 1936, pp. 291-8.

world of work, so Courtis thinks, is being looked upon as the best means of realizing the ideals for which we are striving. Overstreet quite agrees with this, for he writes: "In our deepest human nature we are not onlookers but makers . . . we are learning that work is a prime requisite to happiness . . . work is the common and most obvious means, at our command, of joining in the common human enterprise."¹⁷

11. **Homogeneous grouping.** The terms "ability grouping" and "homogeneous grouping" are used interchangeably in some quarters. But attention is called to the fact that when pupils are grouped according to any given ability, as measured, let us say, by intelligence tests, they may still be far from homogeneous as regards maturity, past experience, or traits or abilities other than those measured. It frequently happens that pupils in industrial education are grouped on the basis of intelligence. For purposes of academic instruction this is at least a start toward homogeneous classification, but for purposes of shop instruction it is not. Classes so grouped are not likely to be "homogeneous" for purposes of industrial education. The arrangement, however, may be desirable and even necessary for purposes of general school administration. Merely to have shop classes thus classified is far from individualizing instruction. Even with the best homogeneous grouping that can be made, individual differences will still be present and instruction will need to be individualized.

Since industrial education both on an arts and on the vocational level is largely individual—the amount varying, to be sure, from place to place and within the same schools—it is quite probable that homogeneous grouping is not as necessary as it is in academic subjects. For purposes of related instruction in mathematics, and science given on a vocational basis, homogeneity is unquestionably desirable. In shopwork the facts have not been conclusively established.

12. **Differentiated projects.** A method long employed by shop teachers in the effort to adapt instruction to varying capacities and interests of pupils is to have them undertake projects involving learning difficulties suited to each. In industrial arts where

¹⁷ H. A. Overstreet, "When Work is Like Play," *Occupations*, Vol. 13, February, 1935.

it is the usual practice to let the pupil keep what he makes (with certain limitations) there is likely to be considerable range in the kinds of projects undertaken. Some teachers have rather carefully graded series of projects, arranged on a difficulty basis, and also selected with a view toward appropriateness and student interest; from which they permit only minor variations such as details of materials used, of proportion, design, and finish. A general trend is to permit variation and substitution of projects as the learner demonstrates, by previous work well done, his ability successfully to carry forward projects calling for superior skill and sustained effort.

In vocational industrial education the projects may likewise vary greatly, the chief difference being that it is more common to work on jobs for the school than for the pupil. But even this is not always true; as, for example, in many automobile shops where the pupils work on their own cars if they wish to do so. The trade teacher, like the industrial arts instructor, assigns project work with due consideration to the varying abilities of the pupils.

In teaching drawing the same principle is frequently carried out with the more advanced pupils particularly, but in the introductory stages the assignments made tend to be more uniform for all pupils. In spite of this, variations in ability are recognized by having all pupils progress as rapidly as they can do so.

In some types of shop instruction, as for example in printing, many instructors indicate it to be their belief that a well-graded series of exercises, embodying a good range of various types of typography, gives a better approach than to put the pupils on project or production work which may not include the range of theory and practice that should form the basis for practical printing, if vocational; or for exploratory and try-out purposes, if given on an industrial arts basis.

13. Individualizing instruction sheets. Henig has proposed that instruction sheets be prepared in such a way that each one is set up on the basis of three levels of accomplishment.¹⁸ He points out that there are at least two difficulties involved in the plan, but he

¹⁸Max S. Henig, "Individualizing the Instruction," *Industrial Arts and Vocational Education Magazine*, Vol 24, No 11, November, 1935.

has suggestions as to how they can be met successfully. The first is that of deciding upon the most appropriate subject matter for each of the three levels, and of selecting the best projects, problems, and questions for them. To do this well involves the service of experienced and well-trained teachers.

The second difficulty to be overcome is that of determining the level of accomplishment to be undertaken by each individual in the class. He proposes an interesting way of handling the difficulty. It consists in placing a time limit on each sheet. By having each made up of successive units, *A, B, and C*, the student is maneuvered into the position where he must determine for himself how much he will accomplish. If unit *A* is thought of as the minimum core accomplishment that will be accepted, then the satisfactory completion of units *B* and *C* would represent successively higher accomplishment. Under this plan each of the individuals would get a sense of accomplishing at least the required minimum and it would be an incentive to all or most of the group to do their best.

14. Individualized part-time education. Individual instruction has been largely employed in part-time classes—especially those operating under compulsory legislation. The law usually specifies that individuals between given ages must attend, for a specified number of hours per week, the schools or classes operated for them. This means, in practice, that pupils will begin at all seasons of the year and that they will drop out at equally irregular times. This makes individual instruction inevitable for satisfactory results.

Hayes calls attention to the fact that individualized instruction programs permit qualified individuals to: (1) enter at any time; (2) continue school work where they stopped; (3) progress in accordance with their ability; (4) be promoted from unit to unit without loss of time; (5) graduate and enter employment without loss of time.¹⁹

Additional advantages claimed by him are the following ones: (1) By graduating whenever their work is completed the labor market is not glutted twice a year; (2) the usual end of the

semester turmoil involving records, reports, lockers, books, etc., is eliminated; (3) flunkage is almost completely eliminated since the slower pupil is given more time; (4) a financial saving results from eliminating repetition of work for those who fail; (5) the plan can be adapted to a variety of pupil needs, as for example: (a) pupils employed half time; (b) those in school one day per week; (c) those there full time.

Drill is often given best on a group basis. Where instruction is on a purely individual plan repetitive drill to overcome the effects of forgetting is sometimes crowded out.

There is also quite a different reason for using group instruction where it is applicable; that is, to conserve the teacher's time and energy. There usually are explanations, directions, or statements of fact that need to be made, from time to time. Why make them to one person at a time when a more efficient method is at hand?

All this must not be misinterpreted to mean that industrial teachers ought to give more group instruction than they now give, nor conversely, that individual instruction had better be given more commonly. Each teaching situation deserves careful case-study; generalizations have their limitations.

15. Try-out and exploratory experiences. Among the methods and techniques of adapting instruction to social and to individual needs the practice of providing try-out and exploratory experiences deserves prominent mention. Whereas life at its best is a continuous exploratory experience, we think of the junior high school period as the one where these experiences are particularly to be stressed. Although it is true that the schools can give but representative sample experiences of the world of work through industrial arts instruction, and although the insights and appreciations that can be taught in the brief time that is devoted to industrial arts are limited in scope, when compared with what there is to understand and to appreciate in this great, seething, complex world of ours, one cannot help being enthusiastic about what is being accomplished through the try-out and exploratory training given under the vigilant eye of the teachers of industrial arts. Such instruction unquestionably plays an important part in socially conceived and democratically administered in-

struction. It is one of a number of ways in which education is being directed to the ends of group welfare and of individual well-being.

Vocational industrial education, too, has its exploratory and try-out features *even though it is in this case assumed that a vocational choice has been made*. The experiences are selected with direct reference to their application and educational value to this vocation, thus giving better insight and appreciation as well as specific instruction for a vocation that will probably be entered when the individual becomes an active participant in the world of work.

16. Adjustments to special interests. It will be observed that occupational pursuits that were formerly followed exclusively by women, such as cooking, baking, dressmaking, and weaving, have been taken over to a considerable extent by men. Others formerly held exclusively by men are now pursued by women as well as by men. Many boys are interested in certain aspects of home economics, as may be judged from the fact that one state reports more than forty such classes for boys.²⁰ Similarly, girls have interests in the realm of the arts and crafts—particularly in those areas which deal with home repair work. Social pressures have retarded the extensive development of industrial arts on a junior or senior high school level for girls, but here and there such instruction is being given.

Bonser has called attention to the fact that, since boys and girls have common interests and needs relative to planning, furnishing, caring for, and maintaining the home, they can profitably take a course dealing with these and such related matters as budgeting, insurance, savings, and investments. He suggests that such "home-living" courses be given on a junior high school level.²¹ On the trade level industrial education has been given for many years to girls in public and private trade schools. Industry also conducts many short, intensive training courses for women and girls industrially employed.

Educational adjustments are essential for those who have employment and for those who have been displaced through rapid

²⁰ Commonwealth of Pennsylvania, 1936.

²¹ Frederick G. Bonser, *Industrial Arts for Public School Administrators*, New York, Teachers College, Columbia University, 1930, pp. 42-3.

changes in their former jobs. Special methods must be developed to provide properly for various age levels and types of employment. For some training must be more intensive; for others, broader; for still others, more general—not necessarily more thorough or extended. The places of instruction, too, will be more varied. Educational programs will extend from the school into the homes, as in club and crafts activities. They will also radiate in widening circles into industry, Conservation Corps Camps, recreation centers, and elsewhere.

Pressey gives a number of practical suggestions for teaching that have a direct bearing upon adapting instruction to social and individual advancement.²² They are:

1. Habituate individuals in work habits—efficiency in study and work depend upon it.
2. Employ scientifically founded methods of teaching individuals how to think—this will raise general intelligence.
3. Keep in touch with the experimental work in education.
4. Aesthetic environment in the school and training in aesthetic appreciation may be expected to give good results.
5. Teachers should carefully examine their own attitudes and methods because attitudes and personality traits are modifiable, and teacher attitudes and traits may influence those of the pupils.

17. Interview technique. Bingham and Moore have called attention to the fact that teachers as well as business people are interviewers.²³ Industrial teachers should be especially interested in improving this technique for the following reasons: (1) They participate actively in furthering vocational guidance. (2) The placement and follow-up service rendered by them as teachers or coordinators demands familiarity with this technique. (3) The many contacts that progressive industrial teachers make with persons in industry as well as with school patrons and school people indicate that much may be gained by knowing how to conduct such interviews in appropriate ways. (4) Familiarity with how to interview is a means of giving the maximum assistance to individuals through personal contact—it is a means of discover-

²² For a more complete discussion, see S. L. Pressey, *op cit.*, p. 574. (Used by special permission of Harper and Brothers.)

²³ Walter V. Bingham and Bruce V. Moore, *How to Interview*, New York and London, Harper and Brothers, 1934.

worker bees around their queen, each pupil trying to get the teacher to do his work for him—which incidentally is not the aim of the worker bees—one would at once conclude that something is radically wrong. That kind of teaching lacks pupil activity, pupil initiative, and pupil thinking. It likewise represents poor teaching technique and indefensible class management. Contrariwise, if each pupil shows zest in his work, is busily and intelli-



FIG. 4. Making a bench test on an ignition unit at the David Ranken, Jr., School of Mechanical Trades, St. Louis, Missouri

gently active, with the teacher regarded as an experienced adult ready to advise and assist where necessary, that is very different.

The title of this chapter calls attention to the fact that learning is always an individual matter. Klapper has well said: "Knowledge is never a generous gift; it is always a reward for self-activity. The capable supervisor judges classroom performance not by the degree of activity exerted by the teacher but rather by that of the pupils."²⁶ Similarly industrial teachers are judged not so much on the basis of the quality and the amount of the manipulative work a teacher does—with pupils looking on while he does it—as

²⁶ Paul Klapper, *Contemporary Education in Principles and Practice*, New York and London, D Appleton-Century Co. 1929 Chapter XV.

on the basis of the quality and amount of work, both mental and manipulative, that the class does.

Self-activity in the interest of fuller and richer living implies that individuals must develop what we choose to call "character." The special class teachers of Boston compiled a list of objectives in the form of important laws or guiding principles for the development of character that appear to be equally valid for teachers in other areas of education.²⁷ They are given in the following table:

TABLE III
IMPORTANT LAWS FOR CHARACTER DEVELOPMENT

- | | |
|-----------------------------|----------------------------------|
| 1. The law of health | 6. The law of duty |
| 2. The law of self-control | 7. The law of good workmanship |
| 3. The law of self-reliance | 8. The law of team work |
| 4. The law of reliability | 9. The law of kindness |
| 5. The law of fair play | 10. The law of obedience to duty |
| | 11. The law of loyalty |

The argument may be advanced that adapting instruction to individual and to social needs is costly. So it is. But let us compare the cost of education with that of crime. The Wickersham Commission which studied the cost of criminal justice in some three hundred representative cities did not give a figure for the total annual cost of crime. However, on the basis of figures published in the *N.E.A. Journal*, the net cost is near \$1,500,000,000 per year.²⁸ The total cost for all public education in the United States, in 1928, including college education, was about \$2,500,000,000. This means that we spend about \$1.50 because of crime for every \$2.50 spent for tax-supported education. The per capita cost per law-breaker is estimated at \$1500 per year; that of students about \$100.00 per annum.

19. Factor analysis. In determining how and to what extent industrial education can be adapted to individual requirements, the teacher may wish to consider such factors as the following:

(1) *Physical strength.* In the junior high school, particularly when power machinery is not available and when the nature of

²⁷ *Special Class Teachers of Boston, Character Building for Special Classes*, Boston, Board of Education, Business Agent, George T. Angell, 1931.

²⁸ Frank W. Hubbard, "Crime Costs; Everybody Pays," *Journal of the National Education Association*, March, 1933, pp. 85-6

the work calls for considerable physical strength, the instructor will want to judge rather carefully the job requirements in terms of the physical strength and stamina that any given job will require and compare it with the strength of the individual who wishes to undertake it. Some young people are inclined to overestimate their strength and there is a tendency for them to want to select shop projects that are entirely too hard for them. Never having done the job before they do not understand what it takes to carry it through successfully. It will also be found that other pupils are a bit timid about undertaking work which is well within the range of their strength. So there is need for guidance in both directions.

The matters of hereditary strength and the status of the pupil's health deserve careful reflection as factors that are important in one's life career. The physical requirements in certain occupations may call for unusual capacity of eyes, ears, lungs, mind, muscular strength, muscular control, and the like. All of these need careful diagnostic attention.

(2) *Mechanical ability.* Mechanical aptitude, which may be thought of as undeveloped mechanical ability, is not easy to determine with precision except through careful testing and observation. Previous experience involving mechanical manipulation enables some pupils to make a better initial showing than others, which might be mistaken for innate differences in aptitude. It is usually wise to ask for evidence of mechanical ability before allowing a pupil to undertake projects involving mechanical ability of too high an order. If a new type of mechanical skill is called for, such as making a dove-tail joint on a cedar chest, it is considered prudent by many teachers to require the pupil to demonstrate his ability on a piece of scrap lumber before permitting him to try to do it on the chest, where failure would be expensive. Similar practices are followed in other types of shopwork.

No doubt there is also danger of underestimating the mechanical ability of pupils. It would be unfortunate to confine their efforts to work that is not challenging to them; that does not call forth their best efforts; that develops habits of dawdling rather than habits that make for achievement on higher levels.

(3) *Artistic ability.* Daily observation of pupils will quickly reveal a wide range in artistic ability. Artistic rendering requires unusual personal skill, but even there much can be done through encouragement. It will be noted that children love to express themselves through various mediums such as crayon, pencil, and paint-brush; that they make commendable progress; and that they get much happiness out of it until some older child or adult spoils their pleasure and thwarts their progress by making uncomplimentary remarks about their efforts. A little sustaining encouragement and a bit of judiciously given commendation will go a long way toward nurturing artistic abilities to fruition. It matters little whether it be in the realm of the practical or of the fine arts, for they are inter-dependent and equally worthy.

Whereas the ability to do things artistically is somewhat restricted, there are good grounds for believing that the realm of art appreciation is open to the vast majority. It is quite amazing to see how children, who have had few cultural advantages—not to mention those who have—will respond to training in art appreciation. The practical arts offer such unusually fine opportunities to teach appreciation of form, structure, texture, and color, and with it all to couple sound education thinking and stimulating creative work.

(4) *Perseverance.* Theodore Roosevelt is reputed to have said that "the chief difference between the young man who succeeds and the one who does not is one of staying power." A similar thought has been put in these well-known words: "Genius, that power which dazzles human eyes, is oft but perseverance in disguise." The practical work that young people undertake in the school shops serves as a means of developing perseverance. It may be the means of evolving staying power and stamina, such as is needed to make a leader in athletics, business, industry, agriculture, or education.

20. *Criteria for judging individualization.* The following criteria for judging individualization in industrial education were inspired by articles written by Wood²⁹ and Courtis.³⁰

²⁹ Ben D. Wood, "Criteria of Individualized Education," *Occupations*, Vol. 14, No. 8, May, 1936, pp. 781-6

³⁰ S. A. Courtis, *op. cit.*, pp. 291-8.

1. Do your objectives fit the learner for a fast-moving, complex, and evolving social order, or for one that is static and uniform?
2. Do your goals include social and economic adjustment or are they primarily concerned with "nails, screws, bolts, nuts, sandpaper, and glue"?
3. Are you sensitive to individual differences and do you adapt instruction to them or do you look upon your classes as groups of identical individuals?
4. Do you have a flexible course of study which provides for varying capacities or do you require all pupils to undertake the same units of work?
5. Do the pupils largely, and with your help, do the planning, executing, and evaluating, or do you have everything "blue-printed" for them?
6. Do you encourage initiative, resourcefulness, and cooperation in pupils or are you the boss and dictator who decides and orders every detail?
7. Is the atmosphere of your shop or classroom congenial to the development of social attitudes and habits or is there an atmosphere of tenseness, artificiality, and compulsion?
8. Do you encourage originality in design, selection of materials, construction, and finish or do you believe in standardization at all hazards?
9. Are club and other recreational activities and out-of-school experiences encouraged or discouraged?
10. Is your judgment of pupils based solely upon your relatively subjective judgment of the shop projects completed or is it founded upon more representative testing, including objective tests and measurements?
11. Does your instruction reflect faith in progress and creative effort or are you helping to paint a picture of despair?
12. Do you think of the community as your shop, laboratory, and classroom, or is it circumscribed by the four walls of your school building?

PRACTICAL SUGGESTIONS FOR TEACHING

In the light of the preceding discussion it remains to call attention to the implications for teaching. To this end the following suggestions may prove of interest.

1. Make an effort to develop a keen sensitiveness to individual differences. Let them be challenges to you to determine, on the

basis of careful diagnosis, what causes them and what can be done with them.

2. Get as much pertinent information as possible about each pupil. An understanding of the background and out-of-school environment may greatly clarify your understanding of each learner. If time for this is limited—as it often is—concentrate on the problem cases.

3. Remember that individual differences, even though they may be at variance with the immediate objectives of your instruction, may prove to be the source of an individual's greatest happiness and of society's maximum good.

4. Progress comes through varying from the normal, the conventional, the traditional, rather than through tight-laced conformity to questionable standards merely because they are old.

5. The ideal for the school shop or classroom is self-activity motivated by social ideals and guided democratically by an experienced, professionally trained teacher. In such school shop or classroom flexibility of curriculum content and adaptability of methods and procedures will be among the means used to stimulate resourcefulness, cooperation, and creative work.

6. Individual instruction often is not only desirable but necessary. However, group instruction may save much time and will prove best under given conditions. There is no virtue in using one particular method to the exclusion of others unless you are sure that the one method is best for that particular purpose.

FOR DISCUSSION

1. Does a plan of using individual assignments—such as instruction sheets—adequately recognize individual differences? Explain.

2. Explain why grouping pupils on the basis of intelligence does not constitute adequate individualization.

3. Discuss the advantages and disadvantages of homogeneous grouping for (a) industrial arts, and (b) trade and industrial classes.

4. Report in detail on Pressey's classification of "General Types of Children" (Chapter VIII).

5. Discuss at length "Individual Differences" as presented by Monroe, DeVoss, and Reagan (Chapter X).

6. Give a report on "Adapting vocational education to individual and occupational needs: a symposium," *California Journal of Education*, 11:73-89, February, 1936.

7. Discuss at some length "Individualizing Industrial Arts," J. E. Hopkins, *Junior High School Clearing House*, 5 114-15, October, 1930

8. Discuss fully "What do we mean by adapting the schools to social and pupil needs?" H. S. Wheat, *N.E.A. Proceedings*, 1935, pp. 583-9

9. Describe one or more ways in which creativeness may be encouraged in industrial arts and vocational industrial education.

10. To what extent should group instruction be used in teaching. (a) general industrial arts shop; (b) a vocational shop class in which you are interested, (c) mechanical drawing?

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CHAPTER III

DEVELOPING PERSONALITY IN TEACHERS AND PUPILS

A CONSIDERATION OF TRAITS THAT MAKE FOR SUCCESS

1. What is personality? "Personality" is a term of many connotations. To some it is a term that is used by lazy thinkers as a "catch-all" term that enables them to evade more careful analysis of personal traits.¹ To others it is the basis of charm, power, leadership, and success. As commonly used, the term "personality" stands for leadership qualities in the realm of government; for traits that lead to achievement in the professions, to success in business and in industry; and for superior service in teaching.

From the psychological point of view, personality represents the sum total of the traits one possesses. One's personality, as others see it, is the outward expression of the interaction of one's inner traits. Viewed from the standpoint of education, personality involves sensitiveness to situations, an appraisal of the conditions involved, and the purpose to do something about it.

Three different uses of the term are mentioned by Thrasher.² In popular usage, he says, personality consists of traits that enable an individual to attract attention; to hold interest; to get action from others; to win popular favor. The second, the *behavioristic* or objective concept of personality is "the sum and organization of the reaction patterns, both inherited and acquired, belonging to an individual person." This, it will be observed, is a psychological concept of what constitutes personality. The third one, the *sociological* concept, conceives of personality as a necessary qualification for an individual functioning successfully as a

¹ A. S. Barr, and William H. Burton, *The Supervision of Instruction*, New York, D. Appleton-Century Co., 1926, p. 553.

² Quoted by W. R. Boertman, *Developing Personality in Boys*, New York, The Macmillan Co., 1930, p. 13.

member of the larger group or society of which he is an integral part.

Without doubt *personality is as complex as are the traits that give expression to human behavior*. We think of such factors as energy or dynamic power, of emotional reactions, of appreciative understanding, of one's sense of values, and of courage to act as a few of the traits that make for "personality." An individual's interests, hobbies, vocational pursuit, and the way he responds to others are further factors on the basis of which his personality is judged.

2. *Importance of personality.* The great leaders of all time, as well as the great teachers of history have been men of inspiring personality. The importance of personality to teachers and to all who help to guide young people and adults may be sensed when it is realized that some of the deepest and most far-reaching impressions made on mobile minds are frequently the outgrowth of influences and associations quite independent of the spoken or written word. The man who possesses what we call personality may sway multitudes by his oratory, like William Jennings Bryan, the Great Commoner; by his simply stated message, quite devoid of oratorical effort but equally effective because of the character or personality that it reveals, as illustrated in the manner of speaking used by the noted Scotch missionary, David Livingstone; by example, such as the devotion shown by Ruth to Naomi; and even by silence, as employed so effectively at times by former President Coolidge, by Colonel House, and by Charles M. Schwab of whom Crowell said, "Without a single word, Mr. Schwab can flatter more than any man I ever met."³

Personality has been called "the keystone in the arch which spans the chasm of defeat." That figure of speech is not half bad. Morris has shown that temperamental make-up is more important than intellectual achievement as a basis of teacher success.⁴ Her study of personal traits and success in teaching indicates that the latter is more a matter of "favorable proportions of the several measured characteristics which are common to all stu-

³E. T. Webb, and John B. Morgan, *Strategy in Handling People*, Chicago, Boulton, Pierce and Co., 1931, p. 36.

⁴E. H. Morris, *Personal Traits and Success in Teaching*, New York, Teachers College, Columbia University, 1929, pp. 2, 5.

dents, rather than a matter of a particular combination of certain qualities possessed by only some students." From this one may infer that we all have this much-to-be-desired thing—but in varying degree. It likewise appears to be in accord with those findings and with prevailing opinion that one may have a charming personality without possessing good looks; or one may inspire in spite of certain distinct limitations provided that the proportions of other essential characteristics are such as clearly to outweigh the shortcomings, and thus produce a positive and favorable balance of traits making for "personality" and success.

3. **Types of personality or traits.** The older psychology calls attention to types of personality. To illustrate, James mentions the rationalist or tender-minded, in contrast with the empiricist or tough-minded person; Jung defines the extrovert in contrast with the introvert; others speak of those who think in the concrete as a type different from those who can visualize things in the abstract. In common usage we speak of the salesman type, the research type, the pugilist type, the teacher type, and many others. But are such classifications valid?

The evidence concerning personality traits indicates that personality depends upon the interaction of practically all the traits one possesses and that only a small minority of all individuals fall into such types as those mentioned.⁶ Even such classifications as mechanical type in contrast with clerical type are of questionable value, for purposes of careful diagnosis or description, because the man who appears to be of the clerical type may make a first-class mechanic just as the other may make a success of clerical work or business.

The range of ability in the various occupations, including the professions, is apparently great. Thus one may find doctors, lawyers, engineers, architects, industrial teachers, and other professional folk of greatly varying abilities. And it is not at all certain that all are as well fitted for the "type" they happen to represent as some others that are quite different. An inference that may be drawn from this is that it is important that teachers should constantly be on the alert to detect, in pupils, personality

⁶For a more complete discussion, see L. F. Shaffer, *The Psychology of Adjustment*, Boston, Houghton Mifflin Co., 1936, pp. 282-319.

traits that may be used toward their growth and enrichment of their educational experiences.

4. Can personality be developed? The purpose of education is to bring about an individual's greatest possible development by modifying his traits in line with the best interests of society. Some characteristics need to be strengthened, others modified to meet present-day conditions, and some may need to be discouraged. There is little question as to whether or not this can be done. Education is directed toward this end. The essential question, as Charters has pointed out, is not whether personality can be developed but whether we can so speed up the process that we can accomplish in a short time what would, under less advantageous circumstances, take long years for realization.⁶ Speaking with reference to the modifiability of personality, Campbell has called attention to the fact that just as conscious personality may, under cultural influence, repress or even withhold direct expression to crude, or immature, pleasure-seeking tendencies, so, likewise, selfish or egoistic tendencies that conflict with accepted standards of social behavior may be modified or repressed.⁷

The belief is held by many who are familiar with the nature of industrial education that the experiences called for make very definitely for wholesome personality. The social value of handwork has long been recognized. Bennett quotes from ancient writings in the following manner: "Beautiful is the intellectual occupation if combined with some practical work" and also: "He who lives on the toil of his hands is greater than he who indulges in idle piety."⁸ Economic dislocations, which curtail opportunities for work, emphasize in our minds the great social value of all honest work. Industrial arts education, because it stresses finding out for what kinds of work people are best fitted, and vocational industrial education, because it gives a specific instruction and training for vocational competence, both clearly involve the

⁶ W. W. Charters, *The Teaching of Ideals*, Chicago, The University of Chicago Press, p. 14.

⁷ Charles M. Campbell, *Human Personality and Environment*, New York, The Macmillan Co., 1934, p. 157.

⁸ Charles B. Bennett, *History of Manual and Industrial Education Up to 1870*, Peoria, Ill., Manual Arts Press, 1926, pp. 13-14.

modification of mental and physical traits. Both, it is believed, contribute significantly to the development of personality. And because the atmosphere of the school shop is typically democratic, creative, and social, and also because the subject matter and the instructional practices are life-like and intensely interesting, may we not conclude with reasonable certainty that per-



FIG. 5. An industrial arts class in a corner of the general electric shop of the Eagle Rock High School, Los Angeles, California.

sonality is being developed through industrial education rather rapidly and effectively?

5. The integrated personality. An individual is said to possess an integrated personality when his perceptions, reactions, emotions, and habits combine in ways that indicate coordination and effective adjustment. An integrated personality acts as a well-balanced whole; it can stand the stress and strain of life and its vicissitudes. It is sensitive, responsive, and effective. In contrast with it, the unintegrated individual reacts in a fragmentary, partial, and incomplete way. Integration has its biological, its

health, social, and economic, as well as educational, aspects. Since the mind and body are integrated, and as the nervous system represents an integrating force, it may be seen that bodily health is important as a means of maximal integration.

The emotions play an important part in integration. They must, if possible, be kept on a fairly even keel. To this end a well-balanced program of constructive work, of healthful recreation or play, and of refreshing sleep is to be recommended. One cannot long ignore the fundamental laws of nature without having to pay the penalty.

The sense of accomplishment—of feeling that one has overcome obstacles and that progress has been made—is favorable to integrating personality. So, if the teacher can make assignments of work that lie within the capacity of the learner, thus enabling him to feel the stimulating effects of accomplishment, instructional practice will make for coordination of mind and body and of personality.

By cultivating a wholesome sense of humor one may likewise make progress in the desired direction. It has "saved the day" in many a tense and critical moment. Abraham Lincoln was famous for the way he was able to relieve what would otherwise have been embarrassing situations by his kindly, ready wit and keen sense of humor.

Inadequate integration may be a developmental defect that can be caused by uncongenial and inharmonious home conditions, by neurotic ancestry, by repressive discipline, by unappreciative teachers, by vacillating class management, and by many other factors.*

6. Success traits for teaching. In the literature dealing with teaching and those who instruct, frequent references are made that indicate that much of the success of instruction depends upon the teacher. McKenny quotes Bishop Spaulding: "What the soul is to the body, what the mind is to the man, that the teacher is to the school."¹⁰ And, he continues, "We may rightly measure our education not by the number of years we have spent in the

*L. F. Shaffer, *op. cit.*, p. 386.

¹⁰Charles McKenny, *The Personality of the Teacher*, Chicago, Row, Peterson and Co., 1910. (Used by special permission of the publisher.)

school but by the number of stimulating, suggestive, and inspiring teachers it has been our good fortune to have known."

McKenny holds that sincerity is very important as a personality trait for teachers. It is of great moment, he thinks, because teaching requires courage, fortitude, strength of purpose, and leadership ability, all of which are of short duration with those who lack sincerity. Sincerity gives courage whereas a flip-pant, vacillating attitude toward life saps one's strength and produces moral flabbiness. We may overlook many shortcomings in our friends. By definition a friend is one who knows all your faults and likes you in spite of them. But the one thing we demand, even of our friends, is sincerity. "Neither cleverness nor craftiness can take the place of simple, straight-forward, down-right honesty of heart. It is the bed-rock of a teacher's character."

Another trait rated high by him is sympathy.¹¹ It gives insight into human nature; it is a priceless possession, McKenny holds, for the highest service as well as for the most advanced culture. "The greatest benefactors of the race have been men of great sympathies." Men of sympathy show self-restraint, good temper, and that highly prized quality known as tact. "Lack of tact," he adroitly points out, "cools your friends and heats your enemies. . . . Put tact and talent side by side in a contest for position and power involving the favor of men and nine out of ten times, tact will win."

The development of personality is very important for teachers, not only because success in educational work is largely conditioned upon it but also because teachers are regarded by many pupils and adults as models that set standards of conduct and as examples of good citizenship. A consideration, therefore, of success factors in personality is likely to be of interest to teachers as having implications for their personal growth as well as for pupil understanding and guidance. An exhaustive study of teacher-traits was made by Charters and Waples.¹² These traits were ranked with reference to five classifications, namely: senior high school; junior high school; intermediate grades; kindergarten-

¹¹ W. W. Charters, *op. cit.*, pp. 349-52

¹² W. W. Charters, and Douglas Waples, *The Commonwealth Teacher-Training Study*, Chicago, University of Chicago Press, 1929, pp. 14-19; 223-44.

primary grades, and rural schools. The rank-list of desirable teacher-traits for the junior high school varied but slightly from that of the senior high school. Some of the items will now be discussed from the standpoint of their value for teachers of industrial education.

(1) *Breadth of interest.* A teacher's value, in and out of school, can be measured to a considerable extent by the breadth and the depth of his interests. Other things being equal, the industrial teacher who keeps in close touch with contemporary life, and who interests himself in community, state, national, and international affairs, is more valuable than the teacher whose horizon is circumscribed by his daily round of specific duties. A teacher's training must extend far beyond the achievement standards expected of his learners. This training enables him to motivate, enrich, and deepen instructional knowledge and to inspire, through superior skill, the manipulative side of the work. Breadth of interests leads to breadth of understanding; to deeper appreciations; to richer living; to more inspiring and more effective teaching.

(2) *Self-control.* Before one can hope to lead others, one must himself have, and give evidence of being, master of his own emotions. In the teacher one looks for dignity, poise, reserve, calmness under stress, and sobriety. These same qualities are assets to youth as well as to adults. By exemplifying self-control the teacher makes effective instruction possible, and contributes indirectly and subtly—but positively—toward shaping ideals in the pupils.

(3) *Good judgment.* A teacher possessing good judgment knows how to get at the facts of problems and then handles them wisely. Making many rules for class control shows lack of good judgment. Putting the letter of the law above the spirit of it is another case of mistaken judgment, for justice is impossible without wisdom. Appropriate dress gives evidence of one's judgment. What is fitting for a sophomore in college may not be so suitable for his father or his teacher. There can be much difference between being appropriately dressed and expensively clothed. Both teachers and pupils should be dressed according to the conditions under which they are working. Judgment is called for in handling disciplinary

cases, in dealing with parents, school officials, and business people. Emergencies likewise demand prompt and good judgment. In fact the need for good judgment appears to be endless. Since there is such great demand for using discretion and intelligence, one can infer that instruction which develops good judgment is much to be desired. Industrial education offers many opportunities to develop judgment in life-like problems and in true-to-life settings.

(4) *Forcefulness*. Firmness and decisiveness are needed by those who would lead in the realm of business, industry, or teaching. Class management involves these qualities which spring from courage. One may be forceful without being an autocrat or a dictator. It is possible to possess a forceful personality quite apart from unusual physical strength, for whereas one is inclined to look for forcefulness in robust individuals, one can be disappointed in this. Courage is more a matter of emotional control than of muscular strength. Forcefulness as a trait can be cultivated, for courage appears to come, in part, from experiencing success. If school assignments are made so that the learner can master them, his confidence in his own ability will normally increase and instead of developing an inferiority complex, as he might through failure, he can perhaps develop the qualities of character that one associates with a forceful personality.

(5) *Scholarship*. This quality is regarded by some as more important for academic than for practical arts or vocational education. Others take the view that it is equally important in the latter areas of learning. In industrial education craftsmanship, scholarship, and teaching ability are the "three horsemen" that bring results. Each is relatively useless without the others. Scholarship in industrial education is mirrored to some extent by evident familiarity with the more important professional and trade literature; by contributions to existing knowledge through stimulating, energizing teaching, thought-provoking discussion, creative writing, and original research.

(6) *Honesty*. Ideals and habits of honesty appear to be formulated much in accordance with environmental influences. In the home and in school there is frequent need for inculcating such ideals and for developing the proper habits. In industrial educa-

own conclusions. We associate open-mindedness with tolerance and think of it as an ingredient of broad-mindedness.

An individual who is open-minded takes suggestions in the spirit in which they are given. He can disagree with others without letting it interfere with his respect or friendship toward the other person. He uses suggestions as stepping stones, even as did Benjamin Franklin. At one time Franklin had a cocksure way of making statements that was displeasing. An older man said to him: "Your opinions have a slap in them for everyone who differs with you . . . your friends find that they enjoy themselves better when you are not around."¹² Franklin took this severe rebuke like a man and was, according to his own words, greatly benefited by it. He found that a more tactful and considerate way of stating his convictions was a distinct asset to him in later years. There are many advantages for teachers in personally cultivating this trait, and there are also many opportunities to guide learners in the same direction. Group planning, group discussion, and group participation appear to be especially suggestive toward this end.

(9) *Enthusiasm*. Enthusiasm is contagious; the enthusiasm of youth makes up for other limitations; the combination of youthful enthusiasm and wisdom of experience is next to irresistible. Enthusiasm in teaching is a powerful motivating force that inspires effort on the part of those who come within its reach. Enthusiasm in pupils can be nurtured and used for many useful ends. Enthusiasm has feeling tone; it shows in voice quality; in facial expression; in general bearing and in outlook. A poker face is not conducive to engendering enthusiasm in others, whereas responsiveness is pleasing and stimulating to those with whom we associate.

Enthusiasm does not admit that a thing cannot be done—it accomplishes what looks like the impossible. It finds the way. If headway cannot be made in one direction, another direction is taken. If progress is blocked straight ahead, ways are tried around, over, and under the obstacle.

(10) *Cooperation*. In school and in the world of business and industry, wherever groups of individuals live and work, coopera-

¹² E. T. Webb and John B. Morgan, *op. cit.*, pp. 196-7.

tion is demanded. Other things being equal, the larger the group and the heavier one's responsibilities, the more valuable does cooperation become. It is both an ideal toward which to strive and a procedure toward given ends. Cooperation may be taught—is being taught—very effectively by teachers of practical arts and vocational education as well as by others. The specific methods employed vary according to ever-changing conditions, but the results are evident. Team-work, socialized procedures, group loyalties are among the results. In industrial education definite *habits of cooperation are developed in the normal progress of instruction*—habits that give expression to the ideals which actuate them.

7. *Developing personality through analysis.* By studying the literature dealing with personality development, one may get many helpful suggestions for self-improvement—provided one is willing to ask the question repeatedly: "How does this apply to me?" There is often a tendency to think in terms of how true a given statement is, of others we know, without critical self-analysis. One may take a self-rating scale, check-lists that are used by supervisors in rating teachers, and personality tests, such as the Bernreuter Personality Inventory, and come to a fairly sound conclusion concerning one's points of strength and weakness. The next important step is to resolve to strengthen the weak spots. It will be harder for some than for others to hammer out socially valuable traits on the anvil of life experience.

Friends may be asked to point out mannerisms that are handicaps to better teaching, such as unconsciously repeating pet phrases, playing with one's watch-chain, pencil, or other object. A difficult thing for many who have spent long years working at a trade is to refrain from using ungrammatical expressions which were acquired in industry. Here again, one's friends may not point them out unless asked to do so.

Using one's voice appropriately is an art. Care should be exercised to suit it to the size and acoustic properties of the shop or classroom in which the voice is used. Train yourself to pitch your voice low. Emotional strain is inclined to raise the pitch and a high-pitched voice has a tendency to produce unrest and nervousness in pupils.

Many helpful suggestions may come from tactful, constructive supervisors, and through observing others teach. Professional conferences can likewise be a source of fruitful ideas for those who actively participate in them.

8. **Getting along with others.** For the vast majority of persons it is tremendously important to learn to get along in a friendly and harmonious way with others. In fact, there is good reason for believing that there are few things in life that are more important. Individual as well as family happiness is at stake when personality adjustments are inadequately made. It would seem, therefore, that teaching this important art is in line with educating toward a better tomorrow—and it is probable that the teachers of industrial education will want to assume their full share in this task. Group projects and activities of various sorts may give training in it. Considerateness, sympathy, and other traits previously mentioned are involved. A genuine interest in others is basic to developing mutuality of understanding. Everyone has certain special personal interests, such as hunting, fishing, and other sports; gardening, music, literature, craft activities, and the like. By showing genuine interest in them, bonds of regard and fellowship are established.

In using jokes in order to make others feel at ease, or to illustrate points, it is usually better to let the joke be on yourself, or on some imagined individual who will not be mistaken for those with whom the joke is shared. Jokes are also effective if they convey a compliment to those who hear them. An appropriate use of jokes is appreciated by pupils as well as by adults.

The ability to mix with people, to make them feel at ease, to have them respect one, and to win their confidence calls for human understanding and social insight. One's mental attitude toward others and with respect to one's aims is highly important. A little analysis will show that all men who have become prominent in their particular area of special interest were not born with a silver spoon in their mouths. Booker T. Washington, the well-known founder of Tuskegee Institute, was born a slave; Henry Ford was a mechanic; Herbert Hoover was left an orphan at ten years of age; Charles P. Steinmetz, the electrical wizard,

came to America penniless, as did James J. Davis and many others who have served America in large ways.

9. *Methods of teaching ideals.* Ideals are objectives or goals toward which one may strive. In this sense they become standards of action. Personality traits or qualities that one would like to possess become ideals, objectives, goals, if they are striven toward. By "character" is meant the most important and basic traits that make up personality.¹⁴ Mechanical ability is regarded by some as a unique trait, and by others as a composite of personality traits, but one ordinarily does not think of it as a character trait.

Two quite different methods are commonly recognized in teaching ideals that are to serve as standards in character education. They are the indirect method and the direct one.

(1) *The indirect method.* When the indirect method of character training is used it is customary to tie-in the instruction with the situations or the problems as they arise. For example, if a pupil offers to let another use a tool or machine that he himself wished to use at the time (thus displaying an unselfish attitude), the instructor might appropriately commend him for it. In this way a natural setting is supplied; the case is concrete; the principle involved is clearly understood; and the result is probably better than if the stage were set artificially.

The chief weakness with the indirect method of moral instruction lies in the fact that it is incidental rather than planned. There is no certainty that the necessary ground will be covered. There is no check-up on what has been given, and no comparison with a check-list or course outline to see what has been taught. It is held by those who favor the direct method that a matter of so great importance as character building must not be left to chance.

(2) *The direct method.* This method calls for analysis of essential content, for course building, and for systematic instruction. The earlier textbooks here and abroad had definite character-building content, such as ideals, moral concepts, and standards of conduct, much on the order of some of the literature used in religious education today. The chief disadvantages in this method

¹⁴ W. W. Charters, *op. cit.*, Chapter II.

are quite obvious: the setting is rather artificial; it is easy for the reader to think it applies to someone other than himself; the lesson may not be timely—not suited to the interest of the learner at the time; and the instruction may not be put into practice because its verbalism lacks the dynamic power of a concrete case.

(3) *Using both plans.* Charters indicates that the indirect plan is the more popular of the two and that there appears to be opposition to teaching morals as a separate subject in the tax-supported schools of the United States. McKown suggests that a suitable combination of these two methods is probably the best solution.¹³ This would call for a greater definiteness of content which would be taught in natural, life-like situations through procedures that are suited to the circumstances.

10. *Personality traits and occupations.* It is not expected that teachers will be so expert in diagnosing character traits that they will replace the experts to whom problem cases are now referred. But teachers have responsibilities for pupil guidance and adjustment. In the realm of the practical arts where try-out, exploration, and guidance are important aims, the value of being well informed about personality traits and how they can be modified to meet the requirements of the world of work is quite obvious. Such information is equally valuable to vocational teachers, for the area of specialization or of general practice in the thousands of occupations listed in the United States Census gives ample room for individual interests and capacities, and the task is to suit the job to the individual. But there must also be individual adaptation to jobs as they are and will be. In this sense vocational education involves guidance quite as much as does general and practical arts education.

11. *Teaching personal achievement.* It is probable that few people achieve their greatest potentialities. The desire to accomplish is a rather general behavior trait, but the desire to do and to succeed is but the beginning of achievement. Methods of approach and staying power, both of which are responsive to training, are essential factors. This chapter is largely concerned

¹³ H. C. McKown, *Home Room Guidance*, New York, McGraw-Hill Book Co., Inc., 1934, pp. 266-8.

with ideals. A study of the lives of men who have accomplished much shows that they *developed* confidence in their ability to do what others did not attempt. Their mental attitude of faith in their ability to realize goals before unreachd is one of the great driving forces that *differentiates* them from the average.



FIG. 6. Future airplane mechanics hard at work at the Automotive High School, Cincinnati, Ohio. Mr. Ray F. Kuns, Principal.

If teachers can develop in pupils habits of work, the feeling of self-reliance, the value of self-discipline and regard for others, resourcefulness and initiative, they are starting them on the road to personal achievement.

For purposes of cooperating toward a better tomorrow there must be a vision of goals to be reached. These, then, have a definite place in teaching for achievement. It is important to realize that apprenticeship comes before mastery and that step-by-step

climbing is necessary to ascending. Progress is made by a long series of small achievements. "Little strokes fell big oaks"—if kept up. Teachers may, by so selecting instructional units that they are within the range of pupils, gradually develop confidence in them eventually to undertake tasks far beyond their dreams at the time.

Time is an important factor in life. In industrial education, since much of the work is objective in nature, the time element can be stressed to advantage. Pupils can be taught the importance of conserving time. The world of work is interested in getting things accomplished. A study of the working methods of famous men shows that they early learned to use spare moments; they worked their minds while others day-dreamed or passed their time in activities of doubtful value.

A plan for reading, involving guidance as to the kinds of literature read, is suggestive as a means of helping to discover interests, to broaden appreciations, and to add to understanding.

Personal achievement is made easier through an understanding of human nature; through the use of tact, enthusiasm, optimism, and through perseverance, all of which come within the province of teaching.

12. *Some things to stand for.* The ideal teacher does not exist. But he serves as a goal in the direction of which progressive teachers have long exerted their influence, and toward which true teachers will continue to strive. What are some of the things for which the ideal teacher stands? The following items are merely suggestive without any attempt at exhaustiveness.

(1) *Faith.* Faith in the present and faith in the future; faith as yet unrealized that all shall enjoy full, rich living; faith in our democratically conceived form of government; faith that intense nationalism will eventually give way to peace among nations; faith in the youth of America to meet successfully the ever-changing problems of tomorrow; faith in the deathless, timeless aspect of life.

We, who are older and who have experienced some of the vicissitudes of life, who have seen great men rise and fall and nations grow and decay, have no right, by inference, word, or deed, to deprive youth of the faiths that they must have to rise

to their greatest heights. The school shop or classroom is no place for a pessimist; the schools have no room for him who would take away from youth the zest for active work and for participation in efforts toward better and happier living. On the contrary, the ideal teacher is enthusiastic, joyous, radiant, and inspirational.

(2) *Truth.* The purpose of education—all forms of education, each in its own way—is to make us free. Its object is to disperse ignorance; to replace outgrown beliefs and practices based on dogma, convention, and tradition with factual knowledge experimentally or logically developed through critical analysis. The ideal teacher purposes to reveal the facts rather than exert his energy to prove pre-conceived ideas or theories.

(3) *Ideals.* Neither industrial education nor any other phase of education is so important in its technical or subject-matter content that it can afford to neglect the great ideals upon which human welfare rests. Vocational education at its best prepares specifically for vocational competence and at the same time transfuses technical content and manipulative work with social ideals. The world has seen enough of what happens when people are highly skilled in science and technology without correlative social understanding, economic foundation, and guiding ideals.

(4) *Personality development.* In theory we are more interested in teaching persons than we are in training in subject matter. For some years we have given lip service to teaching boys and girls, and men and women, rather than our special subjects. It is difficult to determine how fully and how effectively this ideal is being realized within the area of our fields of major interest, but it seems quite certain that teaching children and adults rather than knowledge and skills, and how to think rather than what to think, is still largely in the realm of unrealized objectives.

13. *Conclusions concerning personality.* In summarizing the known facts about personality, Burnham calls attention to how little we know about personality traits but how very important the knowledge is that we possess.¹⁸ He reminds us of the complexity of the factors that condition personality, of the great

¹⁸ W. H. Burnham, *The Wholesome Personality*, New York, D. Appleton-Century Co., 1932, p. 660.

range of individual differences in persons, and of the rich opportunities for study that this area of knowledge affords. To him the most fundamental characteristics of normal human personality are: (1) unity; (2) wholesomeness; and (3) integration. One may add that if we strive to put first things first, and if we are to have industrial education that will more adequately prepare individuals for their greatest self-realization, that training in character traits cannot be ignored. Methods and procedures in teaching industrial education—both industrial arts and vocational—can be transfused with training that will make for worthy character and effective citizenship.

PRACTICAL SUGGESTIONS FOR TEACHING

It now remains to focus this discussion upon teaching ideals and character traits. To this end the following points are suggested.

1. Use natural settings to drive home essential elements of instruction—strike while the iron is hot.
2. Make it a practice to concentrate upon specific, readily understood points.
3. As a rule, proceed from specific cases in hand toward general truths. Avoid talking in generalities, the application of which is not evident.
4. Employ a variety of techniques including pupil-participation, socialized discussion, analysis, and learning through doing.
5. Supplement indirect methods with direct ones. Use discretion; employ good judgment and tact.
6. Remember that example speaks more loudly than words. The public as well as pupils expect reasonable standards of conduct from teachers.
7. Put your knowledge of psychology to work: reward desirable traits appropriately and attach annoyance to undesirable action in a discriminating manner.
8. Courtesy, kindness, sincerity, and considerateness ease the road for teachers as well as for others.
9. Using the term "good citizen" may be more acceptable than speaking of moral conduct and ethics.
10. How you say it is fully as important as what you say.

FOR DISCUSSION

1. How can the good will of pupils be won?
2. What are some of the most essential traits that cause others to like us?
3. Should a teacher assume a different personality in school than out of it? Explain.
4. Mention several ways in which desirable traits of good citizenship may be furthered in industrial school shops or classes.
5. Describe one or more ways in which adults may influence one another favorably.
6. Compare the personality factors most desired in teachers with those in supervisors. (See Barr and Burton, *The Supervision of Instruction*, Chapter XIV, for a discussion of the personality of supervisors.)
7. Discuss at length: To protect others from feeling a sense of inferiority is most essential in teaching.
8. Are school patrons—and other people too—interested in teachers giving verbal evidence of superior intelligence? Explain.
9. In what ways may teachers correct mannerisms that interfere with their professional success?
10. Define the following terms: trait, personality, character, good citizen.
11. Describe a good case involving (a) direct character training; (b) indirect training for good citizenship.

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CHAPTER IV

DISCIPLINE

A NECESSARY CONDITION FOR EFFECTIVE TEACHING

1. Meaning of discipline. It is generally conceded that the word "discipline" means different things to various people. There are those who think of it as an unpleasant word that is closely associated with restraint and order of the negative and repressive type. They associate dictation, coercion, and punishment with the word. Others, however, place a much broader interpretation upon discipline. To the second group it stands for natural, life-like conditions or relationships that call for self-control in order that human relationships may be happy and learning effective. Certain aspects of the latter idea are indicated in the following definitions selected from contemporary educational literature.

"Discipline is immediately a means to an end, but ultimately it becomes an end in itself as self-control."¹

"In its broader aspects we may conceive of discipline as the organization of his [a person's] character traits in such a manner that the individual is able to make adequate and effective adjustment to his environment."²

"School discipline is bigger than the accumulations of school regulations and all punitive measures. Discipline is the total influence of the school, which seeks, first to rationalize, and second to habituate, social conduct."³

"In its most modern and inclusive sense discipline means preparing boys and girls for life in a democratic society."⁴

"The present view of disciplinary functions . . . may be stated as follows: (1) to secure such conduct from the pupils as is in every way conducive to the work in hand; (2) to secure this

¹ J. F. Arent, *Excellencies and Errors in Classroom Management*, p. 370

² A. M. Jordan, *Educational Psychology*, p. 405 (Brackets are the writers')

³ Paul Klappert, *Contemporary Education; Its Principles and Practice*, p. 201.

⁴ A. D. Mueller, *Teaching in Secondary Schools*, p. 43.

conduct in a way that continually enriches personality and contributes to the formation of character in the widest sense."⁶

"So when we speak of discipline we have in mind the mode of behavior, the manner of living and the working together of the whole school."⁷

2. Discipline an evolving concept. Everyone knows that the older concepts of discipline varied from those held today. In past generations discipline was noted for the external restraints that were imposed, for the multiplicity of regulations that were to be observed, and for rigidity of its enforcement. Under the old order there was little regard for the feelings of those who failed to meet the artificial standards that were imposed with an iron hand in the home, the school and elsewhere. Neither was there much psychological understanding that might point the way to better practices. The schools of a half-century or less ago were very formal affairs in which order of the restrictive type was widely maintained. In those days a good disciplinarian was one who could enforce unquestioning obedience to the rules; who could instill fear in the hearts of learners, and who could bring about a high degree of conformity to traditional beliefs and practices.

Bossing has called attention to the fact that the evolution of our notions of discipline has closely paralleled changing theological and ethical ideas. He has traced these stages of progress from earliest times when primitive peoples thought of Deity as a ruthless despot and when discipline was often vindictive in type, to the present time when remedial measures and, more particularly, preventive measures are stressed.⁸

3. Newer interpretations of discipline. In its modern connotation discipline is a means of bringing about a better social order through developing, in each individual, right habits of conduct, appropriate patterns of thought, and worthy ideals that shall serve as goals and standards of achievement. The old belief concerning discipline stressed conformity, the new one initiative; the old concept breathed regimentation, the more recent one, self-devel-

⁶ R. W. Pringle, *The Psychology of High School Discipline*, p. 7.

⁷ J. B. Sears, *Classroom Organization and Control*, p. 66.

⁸ N. L. Bossing, *Progressive Methods of Teaching in Secondary Schools*, Chapter VI.

sible to understand such problems and reduce emotional stress through carefully considered means.

It is believed by Titchener that emotions represent a confusion of sensations and feelings. Watson has defined an emotion as "a hereditary 'pattern reaction' involving profound changes of the bodily mechanism as a whole, but particularly of the visceral and glandular system."⁸ He distinguishes three types of emotions:

- (1) The *fear* type, which calls for various avoiding reactions.
- (2) The *anger* type, which finds expression through sundry activities of a more or less violent nature.
- (3) The *love* type, which results in a passive attitude or mild approach.

The classification given by Gates is very similar. It is: (1) emergency emotions; (2) mild, joyful, upbuilding emotions; and (3) sex emotions.⁹

Students of human nature differ somewhat concerning the exact nature of emotions. Thus, while the Gestalt psychology clings to the mental concept of emotions as a portion of the organism functioning as a whole, behavioristic psychology explains emotions as bodily changes not including the mental aspect.

It appears to be clear that emotional states begin quite suddenly and that they disappear in much more gradual fashion; that they involve strong feelings that influence bodily activity and mental reactions; and that they may be definitely influenced through education. To use the nomenclature of psychoanalysis, various forms of shopwork—of practical arts and vocational activities—may represent "sublimated" forms of emotional response. This implies that creative work may serve as a socially desirable outlet for emotional stress. It is a matter of common knowledge how emotional unrest may be soothed by undertaking some creative task, the nature of which varies with the conditions that were responsible for the emotional disturbance.

Industrial arts and vocational education may contribute directly to both physical and mental health—to the former through bodily activity and to the latter by dispelling the emotional stress or confusion that other experiences have occasioned.

⁸ Quoted by C. E. Ragsdale, *Modern Psychology and Education*, pp. 125-6.

⁹ A. I. Gates, *Psychology for Students of Education*, pp. 154-5.

6. **Goals of shop discipline.** The immediate purpose of discipline in the school shop, laboratory, or classroom is to make efficient, socially worthy instruction possible. Democratically conceived discipline has for its goals specific objectives of which the following are representative:

1. To stimulate self-activity rather than teacher activity.
2. To foster initiative and resourcefulness in pupils.
3. To encourage careful analysis and critical thinking among pupils.
4. To develop habits of cooperating with others.
5. To build character traits needed for self-development and for group-welfare.
6. To enable the pupils to acquire knowledges and skills that will function effectively in an ever-changing, complex, and challenging world.

These and other goals are suggested as worthy of attention in programs of class or individual management. One's objectives—whether they be narrow and circumscribed, or broad and embracing—are very vital because they will largely determine the means and the methods of discipline that will be used.

In a well-disciplined shop or classroom the prevailing atmosphere is one of friendliness and congeniality. Pupils are expected to be honest, industrious, cooperative, and interested in their work—and they usually are. It is only occasionally that the instructor's guidance becomes evident, for the group has learned self-activity. A good administrator is one who knows how to delegate responsibilities wisely, who inspires others to want to accomplish things, and who can get others to cooperate effectively. A good disciplinarian is likewise one who has more than average leadership ability, who knows how to stimulate others to worthy effort, who gets results through tactful procedures based upon a keen insight into human nature and upon sound educational principles.

It may be inferred from what has been said that, whereas the immediate purpose of school discipline is efficient learning, there are important concomitants. Bagley believes: "pending convincing evidence to the contrary, that an orderly and well-governed school constitutes a favorable environment for the development

of self-discipline."¹⁰ Discipline, then, becomes a means of learning self-control, which is fundamental to happiness, to self-realization, and to helping to develop a better world.

7. Suggestions for shop management. It is claimed that teachers have more difficulty with problems of school discipline than with any other aspect of instruction. To this may be added that



FIG. 7. Art metalwork, of an industrial arts basis, at Kansas City, Missouri. The instructor, Mr. C. A. Larson, is teaching a group of boys at the West Junior High School how to make pewter bowls, "sugars and creamers," and other articles.

in more than a few instances the kind of discipline that prevails is not conducive to securing the best results. In the hope that the experience of others may be of interest to prospective teachers the following suggestions, which appear to meet with rather general favor, are presented.

(1) *Have a definite plan.* The old saying that "an ounce of prevention is worth a pound of cure" sounds a key-note to securing the kind of atmosphere and setting that are conducive to

¹⁰ W. C. Bagley and M. E. MacDonald, *Standard Practices in Teaching*, p. 27.

effective learning in the school shop, laboratory, or classroom. Experience indicates that it is very important that the teacher be very familiar with what he hopes to teach and with the resources at his disposal. In other words, before the first class meets, he should have in mind the curriculum as a whole, of which his instruction is to be a part, the course of study content for his particular area of instruction, and a detailed knowledge of the units of learning that together make the course-content of his area of instruction. Then the plan must recognize the housing facilities, the nature and extent of the equipment and supplies that are available, and, last, the plan must provide adequately for each individual learner. It is obvious that the teacher should give a good deal of attention to many factors before school opens for work. In school as well as in business and social life, when groups of people meet and work or play together harmoniously, it will be found that someone gave careful, detailed attention to planning these group activities.

(2) *Provide orientation.* Pupils coming into a school shop or into a science laboratory for the first time are naturally curious about the equipment, materials, and supplies that are in evidence. The change from classroom to shop surroundings, and perhaps from one school to another, has a tendency to arouse more or less emotional stress which should be allayed as soon as possible. Several procedures are used. One is to assign each pupil as he enters a place or station in the shop, and as soon as the group is placed to express a few appropriate words of greeting followed by general information and directions. This introduction may be followed by a teacher-conducted tour through the shop for purposes of general orientation, after which work begins. Another plan, which appears to have more merit for experienced than for inexperienced teachers, is to permit pupils, as they enter for the first time, to walk around the shop informally in order that they may satisfy some of their curiosity in this way. As soon as the teacher thinks it appropriate he will assign work stations and proceed with the program of instruction. If power machinery is in the shop, the power may be turned off or the pupils may be instructed not to handle the tools and machines until they have been instructed in their proper and safe use.

(3) *Give safety instruction.* Cressman's study of safety practices in the public schools, as well as those made by others, indicate a distinct need for careful training in safety practices and for having good discipline in school shops as an essential factor in safety.¹¹ Pupils should be shown how lack of consideration for others, how "fooling" and misconduct on the part of a pupil, may result in a serious accident to him or to others. It should be made plain at the outset that any act that produces an accident hazard is a serious infringement upon approved practice. The school shop is not a suitable place to play "tricks" on others. A piece of chalk thrown at an individual in the spirit of fun may cause him involuntarily to shove a hand into the machine he is operating, or into the path of a tool that is being used. Lack of shop discipline is a serious matter. Provide thorough instruction involving individual testing covering the accident hazards of all appliances and materials used in the school shop.

(4) *Routinize details.* If pupils are to develop habits of self-reliance and thought patterns, appropriate to a progressive world, they should be given many opportunities, in the home and at school, to practice such habits and to think through new problems. Toward this end it is suggested that pupils be made responsible for a number of services which have educational value to them and which will also release the instructor for more teaching as compared with "housekeeping." Among these may be classified such duties as:

- (a) Checking attendance and reporting upon it.
- (b) Issuing tools and checking their condition.
- (c) Receiving, caring for, and issuing supplies.
- (d) Keeping records of pupil or class progress, taking inventories, and the like.
- (e) Checking on heat, light, and ventilation where that is necessary.
- (f) Having charge of reference material, of shop displays, bulletin boards, and storage space.
- (g) Being responsible for the cleanliness of the shop—seeing to it that benches, machines, etc., are cleaned by the pupils (in some schools pupils sweep the shop floors—at least during the working day—when needed).

¹¹ P. L. CRESSMAN, *Safety Education in Pennsylvania Industrial School Shops*, Doctor's Dissertation, The PENNSYLVANIA STATE COLLEGE, 1935.

- (h) Making out orders for supplies—either for themselves or for the school.
- (i) Serving as press agents or publicity men for the class.
- (j) Serving as gang leaders, or as shop foremen.

In line with democratic ideals of school administration, such duties as have just been mentioned should be rotated so that each member of the class will have the opportunity to try his hand at each of them, and so that no one need perform such functions to the point where they lack educational value. It is convenient to have a chart of some sort to show the order, sequence, and time each individual is to serve. A number of teachers use a rotating disk so arranged as to show these items conveniently.

(5) *Explain objectives and standards.* The school shop atmosphere will be new to many and it admittedly calls for standards of conduct that are different in some respects from those suitable for academic instruction. As a basis for understanding what constitutes worthy behavior in the school shop the learners should understand that the teacher is striving to develop conditions that will make shop instruction a happy, worth-while, and stimulating experience for everyone; that the school atmosphere is to be natural and life-like; that there will be many opportunities for each learner to cooperate with others and that such co-operation will meet with favor, but that the freedom that is granted must not be misused.

It is generally considered unwise to draw up a multiplicity of rules. This places the emphasis negatively, and is likely to result in artificial standards and stilted and regimented conduct. It is far better to have only a few rules that can and will be enforced. Reasonable standards will appeal to the pupils' sense of fairness; unreasonably restrictive standards will thwart the purposes for which the school is organized.

(6) *Keep pupils busy.* The ability to keep everyone busy and to make each minute count is not only excellent preparation for the world of work but is also at the root of having good shop discipline. When pupils are occupied with work that is interesting to them, and worth while, there will be very little misbehavior. Unsocial ideas and conduct do not flourish where creative work is heartily undertaken. It is the idle hands that get into difficulties

It is considered good practice for a teacher always to have some jobs in reserve that can be assigned to the pupils who finish their work in hand sooner than expected, or who may not be able to proceed at the time with the work originally delegated to them, because of unforeseen circumstances.

A little experimenting may demonstrate that the pupils can be taught to get ready for work at the opening of the period and can learn how to "clean up" at the close of the period faster than may be their custom. An experiment conducted in a school with which the writer is familiar revealed that more time could be saved in this way than was at first thought possible. And, incidentally, there was thereby eliminated the opportunity to do the undesired things that are likely to develop when pupils are relatively idle. The business and industrial world wants men and women who know how to make the best use of time. The place to develop such habits and ideals is in the home and school.

8. What not to do. Although in general it is better practice to stress the positive than the negative aspects of problems, there appears to be value in using contrasts for the sake of emphasizing differences. With this in mind the following points are mentioned.

(1) *Do not punish a group for an individual.* There are times when an individual commits an offense but his identity remains unknown. A case in point was when a member of a school athletic team broke some school furniture in the locker room. The entire team was held responsible. This is usually regarded as an unwise way of handling such a case. It would be better not to punish anyone if the guilty person cannot be apprehended.

(2) *Do not assign schoolwork as a means of punishment.* It is good practice to associate satisfaction with what we wish pupils to do and to associate annoyance with what we wish to discourage. Consequently it is poor practice for the teacher of drawing to say: "Stay after school and do a half-hour of lettering as given on page 24 of the textbook."

(3) *Do not use penalties that create an obvious hardship on the teacher as well as on the pupil.* Keeping pupils after school may give the pupil a keen sense of satisfaction—particularly if the teacher has to miss the scheduled athletic event that may take place at that time.

(4) *Do not lose your self-control.* This is much more easily said than done. It is clear, however, that it pays to keep one's emotions under control no matter how annoying the case may be. There may be times for righteous indignation but self-control is necessary at all times.

(5) *Avoid sarcasm and ridicule.* Sarcasm is a two-edged sword. To humiliate an individual before others through the employment of sarcasm or ridicule, or in any other way, is unwise and unprofessional.

(6) *Do not threaten.* It is unwise to make threats because it may tempt an individual to "take your dare," and it may be hard to carry out the action threatened. A certain basketball coach told his high school team that he would fire any member off the squad if he caught him using tobacco. A few weeks later, on the day before the game that was to decide the state championship, he accidentally came upon his best player smoking a cigar. The coach knew that he would lose the game if he did not let the boy play. However, he had no alternative—he had made the threat and he was courageous enough to see it through. But may he not have handled such a case in a better way?

(7) *Do not resort to corporal punishment.* Corporal punishment should be regarded as a matter of last resort in emergency cases. Temperament, sex, age, and other circumstances must be carefully weighed. In general pupils of junior and senior high school age are beyond the age where corporal punishment might be justified—even though it may be in accord with the state school code and with the policies of the school.¹²

9. Some good disciplinary practices: Having just considered procedures of negative value, let us now give attention to items that are generally regarded as good disciplinary practices.

(1) *Win the confidence of pupils.* Most pupils want to do what is right most of the time. By learning to know as much about each pupil as possible, by showing interest in him, by having conferences if possible with him and with his parents, the teacher may win the pupil's confidence and hearty cooperation.

(2) *Recognize individual differences.* This has been mentioned

¹² A. F. Lehman, "Legal Principles Governing Corporal Punishment in Public Schools," *Educational Administration and Supervision*, 20:495-505, October, 1934.

before but in another connection. Individuals respond very differently to disciplinary measures. A suggestion is as effective with some as more drastic measures are with others.

(3) *Employ positive rather than negative procedures.* It is better to forestall misbehavior than to attempt to correct it after it has taken place. The teacher may remove temptations; he may appeal to the worthy motives in pupils; he may develop a class atmosphere in which it is considered a matter of course to do what is right.

(4) *Lead through tactful means.* Young people as well as adults respond favorably to courtesy and tact. Use suggestions rather than directions wherever possible. Avoid giving orders or commands except in cases of emergency, such as those involving injury to persons or to property.

(5) *Weigh motives and causes.* Look beyond the acts performed to the motives that prompted them and to the causes that brought them about. Remember that justice is impossible without the employment of wisdom. It is easy to be misled by circumstantial evidence.

(6) *Nip disorder in the bud.* The time to act is before misconduct takes place, but, if that cannot be done, the next best procedure is to stop it in the bud stage. The longer an improper situation is ignored, the harder it will be to correct it.

(7) *A good sense of humor is helpful.* Many minor infringements can be dealt with through the appropriate use of humor. A teacher should see all, but some minor infringements may well be overlooked and others may be checked by using humorous illustrations or giving responses that appeal to the sense of humor in pupils. They would rather laugh with others than be laughed at.

10. *Rewards and incentives.* The well-known theory that desirable behavior should be associated with satisfaction and unsocial conduct with annoyance deserves to be applied in guiding behavior. Rewards, prizes, and honors mean much to most individuals, both young and old. This principle has long been recognized in the realm of business where special rewards are given for superior service. It is also used extensively in scouting where a long series of special awards stimulates youths to greater effort.

The "letters" earned by students in sports or other school activities are likewise rewards that serve good purposes. Among rewards that are inclined to make for better effort in industrial education may be mentioned:

(1) *Special recognition.* This may take the form of having one's project displayed in public; of giving it an award of merit such as a classification of first, second, or third best in its class; of praise expressed privately, before the school or through the press, as circumstances may dictate. Such recognition might also be shown through a special card or letter that is sent to the parents, quite independent of the usual report card.

A few appropriate words of commendation given by the teacher from time to time will usually bring good results, for as a rule individuals think highly of their constructive work and they like to have it appreciated. We all know how greatly disappointed children are when some injury comes to what they have made in the spirit of creative craftsmanship. And it would seem that much the same feeling is characteristic of adults.

(2) *Prizes.* Like other forms of incentives, prizes are means toward ends. The monetary value of prizes is far outweighed by the public approval that the prize implies. People, as a rule, value prizes very much, whether they have intrinsic value or not. Tools as prizes appeal particularly to individuals with a mechanical bent. Certain special privileges may serve as prizes. In some school shops pupils are rewarded by being allowed access to the school shop after school hours as a reward for good behavior and superior effort during regular class hours. In other school shops, especially in vocational classes, where the usual work is on projects for the school, the practice is followed of rewarding meritorious service by permitting those who exceed the standard requirements to spend some of their time on personal projects.

It should not be overlooked that there may be disadvantages as well as advantages in giving prizes. In general, prizes of appreciable intrinsic worth should be given very judiciously, for many may feel equally well entitled to them. In awarding prizes for shop projects, as well as for work done in the drawing room, it appears to be best to offer prizes for the various age levels or grades or classes of projects undertaken.

It is manifestly impossible to evaluate fairly the work of beginners in the same class with those of advanced pupils; and, similarly, it is hard to compare the merits of a plate in architectural drawing with one in mechanical drawing, or a project in ornamental iron with one in wood or in the field of electrical construction.

In awarding prizes that are supposed to be given solely on the basis of the quality of the work involved, it is manifestly unfair to consider the attitude or behavior of the pupil as a factor. It should be clear to everyone on what basis the award is to be made.

It is generally recognized that there are pupils in most classes who for some reason beyond their control are at distinct disadvantages in competitions for prizes or awards based only upon achievement. In order to offset discouragement and as a means of stimulating them to the best performance of which they are capable, other incentives, such as commendation for faithful effort and right attitudes, ought never to be overlooked. Success in later life depends upon many factors, of which the latter are an important part.

(3) *School marks or grades.* The teacher's mark or grade is a form of recognition of the quality and quantity of schoolwork performed. In view of the importance attached to it by most parents and teachers, it serves as a distinct incentive to many pupils. But the traditional way of reporting grades has its rather obvious limitations and disadvantages. So much so, that better forms of reports are now being used on a fairly wide basis. It appears to be true that the actual grade a pupil gets is a less reliable index of his ability than is secured from finding out how that mark compares with those of the rest of his classmates. In other words, whether the pupil stands in the upper, middle, or lower portion of his class.

11. *Types of corrective measures.* In contrast with the rewards mentioned in the preceding paragraph, there are a number of well-recognized negative incentives or forms of punishment that are employed by teachers. Not all of these, however, are of equal merit as corrective measures for democratically oriented education. Some of these types of control will now be described briefly.

(1) *Detention after school.* If this plan is used it should be

quite clear that the teacher is *not being punished* thereby as much as the pupil. This is accomplished to some extent by sending all pupils to one room, thus greatly reducing the teacher-load. The plan like all others of its general type should be employed, if at all, in those cases where it gives promise of being effective.

(2) *Denial of privileges.* This is one of the most effective of disciplinary measures if wisely used. When athletes know that they must measure up to certain scholastic standards to stay on the team, when extra-curricular or other highly prized activities are denied students when they do unsatisfactory schoolwork, or when boys know that they must be trustworthy when the shop teacher has his back turned or is out of the shop, or lose certain privileges, they are inclined to try hard to avoid such unpleasant results.

(3) *Sending the pupil to the director.* The practice of sending pupils to the director or principal for correction should be reserved only for emergency cases. Teachers should be able to discipline their students effectively without calling on school administrators for assistance.

(4) *Asking for an apology.* There are times when an apology to the teacher, to another individual, or to the group would appear to be due. Educators are agreed that the spirit in which an apology is made is most vital. A forced apology that gives no evidence of repentance for the misconduct under consideration is worthless.

(5) *Having pupils sweep the shop.* Recognizing that it is poor practice to ask pupils to undertake extra assignments of schoolwork as a means of correction, some instructors ask such pupils to sweep the shop after school hours. Since pupils ought to be encouraged to keep the school shop, or others, in good order, this practice of associating annoyance with such an act appears to lack psychological sanction.

(6) *Dismissal.* This should not be confused with expulsion from school. The former may be for a period or until the pupil may see the instructor privately. Usually teachers are not empowered to expel pupils. This may be the function of school administrators. Dismissal ought to be resorted to on rare occasions only, and then not before less drastic measures have failed.

12. Principles governing procedures in correction. There are a number of principles that are rather generally recognized as being of value in determining action aiming at the correction of conduct. They may be suggestive, particularly to prospective or inexperienced teachers.

(1) *Correction should be just.* In order to be fair and just, the corrective measure used should suit the nature of the offense and the personality of the offender. Distinctions should be drawn between minor offenses and serious ones; between premeditated and impulsive acts; between first offenders and repeaters; between thoughtless misbehavior and malicious acts.

(2) *Correction should be impersonal.* There is general agreement in the professional literature dealing with the principles of administering correction that a teacher should not administer punishment while he is under severe emotional stress.¹² Punishment should be impersonal and not vindictive. The offender should realize that correction is administered by the teacher as a duly constituted leader of a social group—the class—rather than as an individual who has been personally wronged.

(3) *Correct without display.* In most instances, and particularly with minor infringements, a word spoken privately is more effective than a public reproof. Some pupils would delight in misconduct if it would make a public “bero” out of them in the eyes of their classmates. There are occasions when a word of caution needs to be said to the class as a whole rather than to a particular individual—it may be a tactful device that is designed to forestall undesirable behavior. A case in point is when there appears to be a general tendency to do something not suited to the time or place. A pupil is likely to think more clearly when corrected in private than when corrected in public. The device of asking a pupil to report at the close of school in order that the teacher may talk with him has the added advantage of giving the pupil a chance to think over his misconduct and it likewise permits the teacher to view the behavior with less emotional disturbance.

(4) *Reasons for correction should be known.* Few things are

¹² Strebel and Morthart, *The Nature and Meaning of Teaching*, pp. 126-8; and Bossing, *Teaching in Secondary Schools*, p. 164

more irritating than to be corrected, reproved, or punished for an unknown cause. It is considered very necessary that the pupil fully understand exactly why he is being corrected. If the reason is put in terms of his not measuring up to group standards or socially desirable procedures, he is likely to take the correction in better grace than if he looks upon it as a personal affair between himself and the instructor.

(5) *Correction should be certain.* An experienced penologist has said that in his opinion human nature does not change much



FIG. 9. A veneer press made at the Academy High School, Erie, Pennsylvania, by machine shop students, Mr. Edwin Youngbluth, instructor.

but that we have waves of law enforcement and times when laws are not well enforced. When the latter is true, crime is on the increase. Good disciplinarians are known as individuals who make no threats and few rules but administer correction when needed, without fail. With them correction is certain to follow misbehavior. Vacillation in disciplinary matters is ruinous to pupil morale.

13. *Self-discipline through self-government.* Both "self-discipline" and "self-government" are relative terms. The writer is in hearty accord with the ideals that these words imply, but atten-

tion is called to the fact that self-discipline does not come from one's self alone but is in part the result of ideals and guidance provided by parents, teachers, and others. Self-discipline often grows out of relationships with groups.

Self-government in secondary schools must not be interpreted to mean that immature pupils may do completely as they please without regard to well-founded conventions, wise educational principles evolved through long years of experimentation, and mature judgment based upon reflective thought and experience. There is a good deal of difference between genuine freedom and lack of thoughtful planning, for the latter may lead to uncertainty, bewilderment, and chaos. Self-discipline, like self-government in school, it is believed, should be pupil-initiated activity carried on under the guidance of adults. Who, for example, would permit a group of beginners in woodwork to proceed on their own initiative and without guidance to handle dangerous tools and materials or still more hazardous power machinery? But it is perfectly logical for a pupil to initiate the purpose to want to make a particular project in the shop and under guidance to carry this out in such a way that it will develop his self-control and his thoughts and habits that make for self-government. The opportunities to develop self-government may be extended in the degree of control required as the pupil gives evidence of desire and ability to use wisely the freedom that is allowed him. Most of the so-called "self-government" plans in effect in secondary schools provide for self-determination and self-directed conduct only in certain functions—not in everything by any means. And most of such plans are guided to a greater or less extent by responsible adults.¹⁴

14. Relations with parents. It is a matter of common knowledge that school discipline is made easier when there are appropriate teacher-parent contacts. It is also made more intelligent because the knowledge of immediate ancestry and of the home and out-of-school environment enables the teacher to take into consideration those important factors. Since teachers frequently instruct five hundred or more pupils per term, it may be

¹⁴ Roy C. Bryan, "Should Pupils Take Part in Maintaining Good Discipline?" *School Review*, 43:451-5, June, 1935.

seen how difficult it is to make the number of visits to the homes of pupils that teachers would like to make. Frequently contacts of this sort are largely restricted to the most urgent problem cases.

15. When the teacher is absent. Teachers of industrial arts and of vocational industrial education are frequently called upon to supervise a variety of repair and construction jobs coming within the scope of the type or types of shop work that they teach. Whereas some of these jobs are brought to the shop, others are such as to make it necessary for the teacher to leave the shop. There appears to be a considerable extent of agreement that a teacher should leave his class for such and other purposes as seldom as possible. Some believe that the class should not at any time be left without the teacher; others believe that the instructor should develop the kind of attitudes and habits in pupils that will function in later life, where constant guidance or supervision is not always given, and although the class may not work quite as well as when the instructor is present—though that is the aim—it will still be functioning in practice in needful habits for the students. The practice of letting some members of the class work individually in places other than the school shop is likewise regarded as providing practical instructional opportunities and it may, when conditions are right, enable the pupils to develop resourcefulness.

Many shop teachers have developed the general discipline in their school shops to the point where very satisfactory work goes on when they are out of the shop, or when they must devote considerable time to a particular pupil, as is true in some instances where new or difficult jobs are undertaken by individuals in the class.

One of the most serious aspects of the teacher's absence from the shop during class time has to do with safety. There is no absolute agreement concerning whether or not power machinery should or should not be left in operation while the teacher is out of the room. In some school districts it is an absolute requirement that all power be shut off under such conditions; in others only certain types of machines may be operated when the teacher is away; and in still others all activities continue on the same basis as if the instructor were present. But in every instance, and in

the last two instances particularly, there should be present a mature pupil who is functioning as shop foreman in accordance with a plan which has previously been worked out. It will be seen that the particular procedure to be followed should be determined on the basis of maturity, hazards, objectives, and school policy.

16. **Discipline suited to adults.** It is well known that adults do not relish being treated like children and that they should not be so handled. Adults come to school to learn; their objectives are definite. They are quite as anxious as is the teacher that every minute of the time be used efficiently for learning. They are also more set in their ways than younger learners. Consequently any adjustment or change that they are required to make is fraught with greater emotional stress than is normally the case with children. This means that the instructor of adult classes must have insight into adult human nature; that he must be tactful; and that he should have the personality traits one associates with those who are optimistic, who radiate kindness and confidence, and who dispel doubt, gloom, and the loss of confidence which must be overcome, particularly in those who have had to feel the demoralizing effects of extended unemployment.

Adults usually respond quickly to responsibilities entrusted to them. They are eager to show that they can be trusted; that they have ability; that they deserve the faith that is put in them. Experience shows that there is practically no need for disciplinary measures of a punitive sort with adult classes. Adults usually have greater appreciations of what is taught than have adolescents. This, together with their keener interest in learning—because they see it as a genuine life need—greatly changes the problem of school discipline from that typical of all-day classes of less maturity.

17. **Effect of conflicting cultures.** A study made of 1000 delinquents in the Boston area reveals that foreign birth as such does not account for delinquency, but that the conflict of cultures of children that are native born and parents who are foreign born does result in increased waywardness.¹⁸ It is believed that a fast-

¹⁸ Sheldon Glueck, and Eleanor T. Glueck, *One Thousand Juvenile Delinquents*, Cambridge, Harvard University Press, pp. 56-66, 1934.

changing social and economic order tends to increase disciplinary problems in school and outside of it.

The median age of the 1000 delinquents studied was found to be surprisingly low: 9 years and 7 months; the most typical age was between 9 and 10 years. These facts would seem to show that the first danger signals may be noted before the junior high school is reached.

18. Progressive shop discipline. In democratically envisioned educational practice there is a re-orientation which centers in the pupil as a member of the school and of the larger group. The instruction and the methods and procedures are pupil-centered rather than teacher-centered. The work is so directed that it stresses pupil activity more than teacher activity. Emphasis is placed on self-expression as opposed to any effort to cast pupils in a uniform mold.

In the outgrown school shop practice of yesterday standardization was carried too far; quiet was demanded in unreasonable degree; individual differences were largely ignored; and order was stressed to the extent that it was painful. In contrast with this, progressive school shop discipline removes the ban from speech and encourages pupils to communicate and cooperate with one another exactly as it is done in the world of work.

Active rather than passive learning is encouraged. In the progressive school, pupils are mentally, physically, and emotionally active. The teacher's authority is felt rather than being conspicuous. He is the unquestioned leader who uses wisdom and tact in dealing with pupils and with the instructional and administrative staff. His influence upon pupils is wholesome. He keeps in mind that his responsibilities extend beyond the bounds of school tasks to the development of worthy citizenship through specific thought patterns, modes of conduct, and emotional experiences. The teacher realizes that instruction, to be effective, must be clear and comprehensible. He knows how to combine firmness with kindness; he encourages the learners to "carry the ball" whenever possible; he uses fewer directions and more suggestions; he is looked upon by the pupils as their friend and experienced advisor rather than as their taskmaster. The progres-

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sively managed school shop breathes an atmosphere of contentment and effective learning.

PRACTICAL SUGGESTIONS FOR TEACHING

And now, on the basis of what has been presented in this chapter, let us call attention to a few items that may be suggestive for teaching.

1. The ideal discipline is socially inspired and self-imposed. The purpose of discipline is to make every tub stand on its own bottom. Attitudes, ideals, objectives, analytical thinking, and habit formation all can be made to play their parts.

2. People do not get into trouble when they sleep, or when they work constructively and cooperatively. It is when they are idle that trouble begins. Keep everyone busy.

3. Both commendation and reproof stimulate individuals to greater effort—but the cumulative effects of wisely administered praise is better than long-continued evidences of disapproval.

4. The basic thing in discipline is to get the whole-hearted interest of the pupils. The rest is easy.

5. Firmness and fairness coupled with sympathetic understanding and tactfulness will go a long way toward assuring a well-disciplined school shop, laboratory, or classroom.

6. Prevention is better than correction. A teacher who irritates, antagonizes, and alienates is greatly circumscribed in his usefulness as a developer of self-discipline in pupils.

FOR DISCUSSION

1. What difference does the concept of democracy in education make in school discipline?

2. How may discipline develop an outlook or attitude toward life?

3. You find a pupil softly whistling or humming to himself as he joyfully works at his shop projects. What, if anything, would you do about it?

4. What disciplinary problems are most likely to arise in: (a) the school shop; (b) drafting room; (c) science laboratory; (d) locker room?

5. What types of rewards are well suited to promote good behavior in school?

6. Does teacher participation in handling extra-curricular activities have a bearing on discipline in his classes? Explain.

7. What types of negative rewards or penalties are most effective in your field of major interest?

8. What kinds of noise annoy a learner in the school shop?

9. Should a pupil be asked to determine his own punishment? That of another pupil? Should the class decide it?
10. Should a shop teacher attempt to out-yell the noises in a school shop in order to enforce discipline?
11. How should an instructor help a pupil to overcome: (a) lack of self-confidence; (b) laziness; (c) lack of interest; (d) personal animosity?
12. What evidences of a teacher's disciplinary ability would you look for in: (a) the school shop; (b) laboratory; (c) classroom?
13. State your personal convictions concerning the feasibility of self-government in your area of major educational interest.
14. What restrictions are placed upon punishment by the school law or by local regulations in your school system?
15. Indicate how socially oriented class management is broader than punitive discipline.
16. What would you do if you thought a pupil was trying to annoy you? Explain in detail.
17. Show how a teacher's knowledge of personality traits may influence his disciplinary procedures.
18. What privileges would you withdraw as a means of correcting behavior?
19. What personality traits in teachers tend to reduce misconduct on the part of pupils?
20. Make a list of incentives that may be used to stimulate desirable conduct, and explain each briefly.

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CHAPTER V

CLASS ORGANIZATION AND MANAGEMENT

MUCH DEPENDS UPON SYSTEMATIC, ORDERLY, DEMOCRATIC PROCEDURES

1. **Meaning of class management.** In actual practice teaching problems seldom come as independent, self-contained unit patterns, but rather as complex problems having relationships in many directions. This is precisely the case with the area of class management. From one point of view class management borders upon administration; from another it becomes an intimate part of methods of teaching. It is quite impossible to have suitable conditions for efficient learning without considering the ways and means that make for self-control, for democratic interaction, and for socialized management.

Short definitions are seldom entirely satisfactory, and it is difficult to define concisely what is embraced in "class management." In the main we think of it as *relating to the control of the physical conditions and the material things that make for effective learning*. But just as scientific management in industry has its human aspects, so class management must likewise adequately recognize the pupil who is the real center of the educational plan.

In his managerial capacity the instructor is concerned with setting up conditions that will enable learning to proceed at a maximum rate, and along educationally and socially valuable lines. He concerns himself with the tools and materials of instruction, with supplies, equipment, facilities, housing conditions, and health factors. Good management will involve much planning in advance of teaching; it will call for working out cooperative participation toward specific educational outcomes; it will involve delegating responsibilities to pupils in accordance with their maturity and capacities.

2. **The importance of a good start.** It is generally agreed that in teaching much depends upon getting off to a good start. The success of most major enterprises can be traced to careful preparation and detailed planning that was done before the project was undertaken. The plans and specifications for homes, schools, or office buildings are worked out in minute detail before the foundations are laid; the qualities and characteristics of the materials are carefully considered long before they are delivered for use; and every conceivable problem or hazard is painstakingly analyzed before a stone is laid or a nail is driven. In a somewhat analogous manner effective teaching depends upon the careful consideration of a hundred details, each in itself relatively small and insignificant, but just as essential, perhaps, as a lock-nut or a cotter-pin on parts of an automobile.

It is beyond the scope of this chapter to develop an all-embracing analysis of all the factors that must be taken into account. It can readily be seen that these will depend to a large extent upon varying local conditions, but it may be helpful to give brief consideration to some of the things that frequently contribute to a good beginning in teaching.

(1) *Living accommodations.* The teacher who is new to the community will usually have little difficulty in securing good advice concerning suitable living accommodations within the range that teachers can normally afford. School officials and fellow teachers often assist in this. It is important to get accommodations that will be conducive to restful sleep and that will be enjoyable and respectable.

(2) *Preliminary conferences.* The teacher will do well to plan his time so that there will be ample opportunity to have conferences with such administrative officers as the superintendent, principal, supervisor or director, or others who, in that city or school district, are in the habit of meeting teachers. The nature and extent of interviews must depend upon the particular conditions that prevail. The teacher can sense how long the first conferences or interviews should be by being alert to what is said or done by those he visits. It is better to make the interviews short rather than to drag them out.¹

¹ Bingham and Moore, *How to Interview*.

(3) *Orientation within the school.* Many of the larger schools have handbooks for the guidance of pupils which are helpful to new teachers in that they often cover many policies, customs, and special procedures that teachers should know about. One may also get help from regulations of the board of education and from talking with fellow teachers concerning school practices and customs. There may be certain general duties, such as hall duties, responsibilities for home-room service, guidance service, and extra-curricular activities, that it is well to know about before school begins. It may be taken for granted that a teacher's responsibilities will not be limited to actual teaching duties. The school is a community center having interests and extending service in many ways, and all teachers usually share in these according to their abilities and interests.

(4) *Checking the course of study.* In some instances teachers are expected to adhere rather closely to a specified course of study; in other instances they are given much latitude in this matter. In going over the course of study the instructor will do well to estimate as carefully as he is able the probable progress that can be made with the pupils that he will have, in the time that will be available. The rate of progress will depend, to a considerable extent, upon the instructor's ability to manage things so that time and effort will be conserved at all times. Whereas the quality of work done is more important than the amount, it is desirable to stress the time element, for that is very typical of the adult world of work.

It is well to have copies of good courses of study in one's fields of interest, courses that have been tested in practice under conditions that are believed to be similar to one's local needs. But it should also be recognized that slavishly following along lines projected by others will not give the best results. For this reason courses in making courses of study are very necessary for beginning teachers.

(5) *Examining the equipment.* A casual inspection of school shop equipment is not likely to prove satisfactory. Each piece of equipment, both major and minor, should be examined with considerable care, and if it is not in first-class condition a note should be made of the fact so that it can be corrected as quickly as pos-

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(2) *Preliminary conferences.* The teacher will do well to plan his time so that there will be ample opportunity to have conferences with such administrative officers as the superintendent, principal, supervisor or director, or others who, in that city or school district, are in the habit of meeting teachers. The nature and extent of interviews must depend upon the particular conditions that prevail. The teacher can sense how long the first conferences or interviews should be by being alert to what is said or done by those he visits. It is better to make the interviews short rather than to drag them out.¹

¹ Dugham and Moore, *How to Interview*.

(3) *Orientation within the school.* Many of the larger schools have handbooks for the guidance of pupils which are helpful to new teachers in that they often cover many policies, customs, and special procedures that teachers should know about. One may also get help from regulations of the board of education and from talking with fellow teachers concerning school practices and customs. There may be certain general duties, such as hall duties, responsibilities for home-room service, guidance service, and extra-curricular activities, that it is well to know about before school begins. It may be taken for granted that a teacher's responsibilities will not be limited to actual teaching duties. The school is a community center having interests and extending service in many ways, and all teachers usually share in these according to their abilities and interests.

(4) *Checking the course of study.* In some instances teachers are expected to adhere rather closely to a specified course of study; in other instances they are given much latitude in this matter. In going over the course of study the instructor will do well to estimate as carefully as he is able the probable progress that can be made with the pupils that he will have, in the time that will be available. The rate of progress will depend, to a considerable extent, upon the instructor's ability to manage things so that time and effort will be conserved at all times. Whereas the quality of work done is more important than the amount, it is desirable to stress the time element, for that is very typical of the adult world of work.

It is well to have copies of good courses of study in one's fields of interest, courses that have been tested in practice under conditions that are believed to be similar to one's local needs. But it should also be recognized that slavishly following along lines projected by others will not give the best results. For this reason courses in making courses of study are very necessary for beginning teachers.

(5) *Examining the equipment.* A casual inspection of school shop equipment is not likely to prove satisfactory. Each piece of equipment, both major and minor, should be examined with considerable care, and if it is not in first-class condition a note should be made of the fact so that it can be corrected as quickly as pos-

sible in a suitable way. By carefully checking the equipment the instructor will secure that detailed knowledge about the equip-

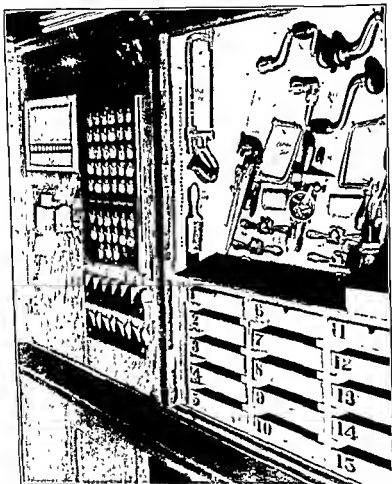


FIG 9. Tool crib arrangement. The outline of each tool is painted on the wall or panel where it belongs so that one can tell at a glance what tools, if any, are missing. Notice the tool checks on the board at the left. This picture was taken in one of the public schools of Detroit, Michigan.

ment that he must have at the outset. If a live inventory is not at hand, it is suggested that an inventory system be installed

before school starts. A new instructor should make a written record of all equipment in his shop, with comments concerning its condition. In some school districts custodians and mechanics working for the board of education use school shop equipment and it is not always returned in as good condition as when it was borrowed. It is important, for the instructor's protection, that at the outset he make careful written records of the condition and extent of tools, materials and supplies.

Cards of standard size, such as 3 inches by 5 inches and 5 inches by 8 inches, are popular for inventory purposes when the card system is used. A separate card is usually used for each piece of major equipment whereas small tools are often grouped in such a way as to save space in recording.

(6) *Checking the supplies.* Note the quality as well as the quantity of the supplies on hand, or that are available, and compare this with your estimate of the amounts that are needed for the work that is planned for the term or year. Develop record forms showing the particular kinds or brands of all supplies used, and make notations on them, from time to time, that will be of help in the future. Prices should be available to the teacher and also to the pupils because intelligent planning should include a consideration of prices.

A knowledge of sources of supplies is likewise valuable to pupils as well as to teachers. Pupils may be taught to check all supplies as they are delivered to see, first, whether the correct amount and kinds have been sent and, second, whether they measure up to the specifications.

In an orderly school shop both equipment and supplies are kept in such a way that they can be checked quickly and so that they are conveniently and systematically arranged. The nature of the various kinds of supplies must be considered. Thus inflammable material must be kept in fire-proof containers; lumber should be protected from moisture and steel from corrosion; and blue-print paper must be stored in dark rooms or in light-proof tubes.

(7) *Storage facilities.* Various ingenious places are used to store clothing, books, and sundry articles that pupils carry from one class to another. Steel built-in lockers flush with the wall are very popular. The conventional shape commonly used for books and clothing is used most frequently, though lockers of other propor-

tions are sometimes seen. Where steel lockers or bins are not available, places for books and clothing are sometimes made with ply-wood or other lumber. Open cabinets, shelves or bins are inspected more easily than those provided with doors, but those with doors tend to present a more orderly appearance and give more protection.

The storage of projects in the process of construction presents a problem in many places. Sometimes storage space is very much at a premium. The resourceful teacher will solve this in the best way possible. Unfinished projects are sometimes stored in bins arranged in any fairly convenient place that can be put under lock and key and that does not detract greatly from the appearance of the shop. Theoretically there is nothing objectionable about having open bins facing the working space in the school shop, but in practice it is often held to be better if such storage bins can be placed where they are less noticeable, as in an adjoining room or in a part of the shop so arranged that the back of the bins face the main shop.

(8) *Shop layout.* A preliminary inspection before school opens may reveal that one or more inexpensive changes could be made in the arrangement of the equipment in the interests of economy of space or of a better arrangement as viewed from the standpoint of shop management. It is conceivable that some of these changes may be made with the aid of the pupils, because there may be unusual educational value in planning and carrying out the alterations. Among such alterations, which at times will materially assist in making good teaching easier, may be mentioned: (1) Re-arrangement of benches or machines to conserve space, or in order to get better natural light; (2) changing wall tool boards to better locations; (3) altering tool cribs so that tools can be stored better or so they can be checked more quickly; (4) substituting diamond mesh or adjustable windows for "solid" partitions which interfere with ventilation, light, and visibility; (5) changing the location or the type of supply cabinets to conform to better school shop practice; (6) adding to the available display space or cabinets in order that a more representative group of projects may be kept on hand for educational purposes; (7) changing the facilities for "washing" or cleaning up at the

close of the period; and (8) altering the facilities for storage of materials, personal effects, or uncompleted projects.²

To show how a very slight expense may save much of the instructor's time, attention is called to a shop teacher in a junior high school who found that because not more than three pupils could wash their hands at one time there was a tendency for pupils to crowd one another at the close of the period. He greatly improved the situation by painting some footprints on the floor near the wash basin which served as a reminder to the pupils that they are expected to line-up for their turn and that they are to progress step by step near the basin, thus avoiding congestion in that area. Lines are sometimes painted on shop floors to indicate the danger zone or working space that must not be entered when another pupil is operating the machine around which the lines are made.

Many helpful suggestions on shop layout and equipment are published from time to time in *Industrial Arts and Vocational Education*.³ Actual visits to schools are helpful toward giving clear ideas about the relative advantages and limitations of various plans of arrangement, and concerning the suitability of the various types and sizes of equipment for given purposes.

(9) *Well-conceived plans*. Absolute uniformity in meeting the class and in starting the work to be done is not desirable. Differences in the experience of teachers, in the maturity of pupils, in the working conditions, and in the background of pupils all point toward working out plans that appear to be best for the particular group under conditions as they prevail in the school. Whereas some instructors favor the informal approach in which pupils may stroll around the shop for a few minutes before they are organized in class form, other teachers prefer the more formal procedure of assigning a work-place to each pupil as he enters.

It is quite common for teachers to use a short time at the outset of the first period in which to motivate the course that is to be undertaken and to give a few brief essential directions and explanations. Since pupils like manipulative activity it would be

² Harry J. McStay, "Accommodating the Large Class," *Industrial Arts and Vocational Education*, 1938, pp. 45-8

³ Bruce Publishing Company, Milwaukee, Wisconsin.

unwise to spend more time than is needed in discussion. The discussion can be brought in naturally and effectively as the work proceeds. It is probable that such details as the names of all the parts of tools and machines are learned more effectively if taught a little at a time rather than in long drawn-out periods. In some school systems teachers are advised not to use the lecture method for more than 15 minutes at a time, if at all, and to devote at least 85 per cent of the shop time to manipulative activities. The actual proportion should, no doubt, be governed largely by the nature of the instructional content.

Pupils can be given a clear idea of the scope and general content of the area of learning upon which they are about to embark without its calling for a time-consuming analysis at the outset. Samples of the kinds of things that are made, pictures of projects that have been completed by other classes, samples of working drawings that are used, and charts showing suggested activities are all helpful in conveying to the pupil the over-view of the activities that are in store for him.

3. Routinizing details. A good manager knows how to delegate responsibilities wisely. The instructor, as a manager, is responsible for many details. In the classroom they center around issuing books, pencils, pens, paper, and supplies. They include distributing and collecting materials promptly, taking roll, making out special reports, and participating in hall duty and the like. In school shops there are also many routine matters that must be looked after in order that everything will run smoothly and efficiently. Good management is probably furthered best when the instructor teaches the pupils how to assume responsibility for many of these functions. It enables the pupils to develop socially and economically valuable habits and worth-while attitudes and also permits the instructor to devote a larger share of his time to his most important responsibility—teaching. Many of the managerial details for which a teacher is responsible may be classified under the following heads, which will be discussed in the order named. (1) Light, heat, and ventilation; (2) care of consumable supplies; (3) care of equipment; (4) recording; (5) care of reference material; (6) safety and first-aid; (7) shop clean-up.

(1) *Light, heat, and ventilation.* In some classrooms and labora-

tories the exposure to the source of natural light is such that occasional attention needs to be given to the adjustment of window shades and to curtains and drapes. Artificial light must also be regulated to suit the requirements. When artificial light is used it is often customary to charge the instructor with the responsibility of turning off the light at the close of the period of instruction. Some schools have direct or semi-indirect ventilation, both of which are regulated in the shop or classroom. All these details of "housekeeping" can appropriately be delegated to pupils who are rotated so that no one will find the work burdensome or in conflict with educational objectives.

(2) *Care of consumable supplies.* This is a relatively simple matter for the classroom teacher, a somewhat more difficult one in the science, foods, or clothing laboratories, and often an exacting responsibility in some of the school shops where large quantities of expensive supplies are handled. In some school shops pupils are given direct access to certain frequently used and relatively inexpensive consumable supplies, whereas they must secure others through the pupil in charge, and there may be a few that are given out only by the instructor. This is done for the sake of economy and because similar plans have proved successful in the world of adult work.

Certain devices tend to reduce wasteful practices. In shops where coils of wire are kept on hand, one good plan is to enclose the wire in such a way that only one end of it is accessible. This prevents cutting the coil at various points other than from the end strand. Since short ends of certain materials can be purchased more cheaply than long lengths, and stock-sizes more cheaply than over-sizes, it follows that savings can be affected through using and issuing such supplies in an efficient and systematic way. This is being done in many school laboratories and shops by pupils. In some instances two pupils are used, one is placed in charge and the other assists. Such a plan is often made self-perpetuating by providing that the pupil in charge is responsible for training his assistant, and the assistant, in turn, instructs his helper when he takes charge. The time of service varies according to circumstances. In industrial arts classes a pupil may have charge for a period only; in vocational classes, where longer shop

periods are the rule and where fewer pupils per teacher are taught, the same pupil may be in charge of issuing supplies for a week at a time.

It should not be assumed that the stockroom boy has little experience of educational value. The room is usually supplied with trade catalogs, reference material, and sometimes with drawing boards and a work-bench. The pupil must learn the proper name of all materials, must learn where they are kept, how they are to be issued, and often he must keep a live inventory of the supplies. The trade catalogs will indicate dealers, give essential specifications, and show something of the range of material of any given type that is procurable. In some instances prices are quoted. The practice of taking the responsibility for issuing consumable supplies is clearly good education for pupils, and the practice of having each pupil in turn train his successor is likewise worth while.

(3) *Care of equipment.* Craftsmen appreciate the tools that make it possible for them to express themselves to advantage through the materials of their choice. A true craftsman selects tools with discrimination and takes proper care of them. One can "read between the lines" when examining a man's kit of tools or by looking at the tools and other equipment in a school shop. A teacher's nature, habits, and managerial ability are reflected in the arrangement and the orderliness of his shop or laboratory.⁴

The teacher who works for long weeks in a shop where the bench tops are spotted with stain, glue, and enamel, where they are scarred and soiled, and where occasional bench stops and vises are out of repair can take a lesson from his fellow teacher who teaches his pupils how to use washing soda, scrubbing brush, scraper, and sandpaper or steel wool, and shellac or varnish in ways that bring out the natural beauty that was lost through wear and possible misuse.

The superior instructor teaches pupils to value and love good tools; he impresses upon them the fact that they will be judged to a large extent by the way they keep their tools. A mechanic

⁴ Sylvan A. Yager, "Arranging the Tools," *Industrial Arts and Vocational Education*, August, 1935, pp. 22-8.

with a good kit of tools in first-class condition stands a much better chance of securing and holding a job than one whose tools are few and in poor condition. A first-class woodworker is as particular about his tools as an artist is about his brushes; a high-grade metalworker cares as much about his tools as does the scholar for his books or the musician for his instruments. Whereas

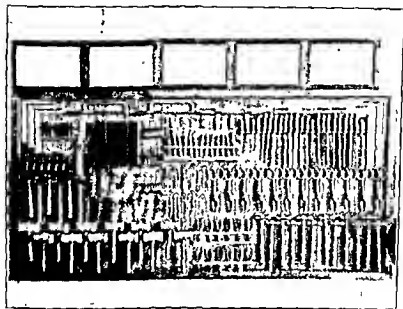


FIG. 10. A tool panel in a general metal shop in the Cooke Junior High School, Philadelphia. Tools are easily checked when arranged in this manner.

the condition of school shop equipment is not an infallible index of the instructor's ability as a teacher, it is a matter of common observation that high-grade teaching and a disorderly shop do not often go hand-in-hand.

Pupils should be taught from the outset to appreciate the thought and skill that have made tools possible; they should see them as important factors in race-development; and they should be taught how to take care of them. With this in mind, pupils may be assigned to make reports upon the history of tools; they should be taught by example how to handle each one, and they

ought to take their turn in checking on the arrangement, condition, and the techniques with which the tools are used.

Where tool cribs or rooms are used it is common practice to use a check system. In essence the system consists of giving each pupil a number of metal checks bearing his number. When he wants tools he goes to the toolroom boy who will accept a "check" for each tool that he issues. These checks are usually hung on hooks or placed where the tool is normally kept so that each missing tool has a check in its place in the toolroom, and the number of the check indicates who has borrowed the tool. Various modifications of this plan are employed.

Pupils usually take their turn at specific assignments having to do with the care of and replacement of tools and other equipment.

The plan of painting the silhouettes of tools on wall boards or on supporting panels, upon which they are kept when not in use, meets with much favor, as one can tell at a glance what kind of tool is missing in case it is not replaced at the end of the period.

In spite of good management a tool may occasionally disappear.⁵ It is no doubt better that this should happen than that the pupils should be mistrusted. Habits of honesty must be developed through repeated practice, and such habits are best fostered when the instructor expects pupils to be trustworthy and reposes confidence in them.

(4) *Recording.* As a means of efficient class management various forms of records are kept. Perhaps the most universal records are those pertaining to class attendance. Some teachers prefer to take this record themselves; others delegate that function to pupils. Individual progress records and class progress records of various kinds are likewise used frequently. Other things being equal, it would appear that good management, on the teacher's part, consists in working out a plan of recording essential data in such a way as to take a minimum of the instructor's time. To this end each pupil may keep his own job cards and when a project or other unit of work is completed, and has been approved by the instructor, the pupil who has been designated as the shop foreman for that time transfers the record to the master sheet,

⁵E. L. Southard, V. J. Lockett, and M. M. Black, "Controlling Theft in the School Shop," *Industrial Arts and Vocational Education*, February, 1936, pp. 55-8.

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⁵E. L. Southard, V. J. Lockett, and M. M. Black, "Controlling Theft in the School Shop," *Industrial Arts and Vocational Education*, February, 1936, pp. 55-8.

which shows graphically the progress of each member of the class.

Mention has previously been made of inventories. Pupils are often of much help in keeping records that show the kinds and amounts of materials, supplies, and equipment on hand.

Other records pertain to requisitioning supplies or equipment. *There is no absolute uniformity in these matters nor should there be.* Records are merely means to ends and the means should be adapted to circumstances.

(5) *Care of reference material.* A rich source of reference material is an asset to any teaching program. These materials are not necessarily expensive. It is often a case of exercising managerial ability in ways that will make reference materials possible. Among the more common forms of reference materials employed in practical arts and vocational education are: samples, models, charts, diagrams, tables, blue-prints, instruction sheets, pictures, periodicals, and books. If such materials are kept in an orderly way, and if they are used as much as they should be, it is reasonable to infer that the pupils will find them exceedingly helpful. Instruction in the use of school reference material is no doubt a step toward developing in pupils habits that bid fair to function in future years. Everyone has need of reference material, and the knowledge that is gained through periodically taking charge of such material for the class can readily be justified in terms of probable present or future life needs.

Some schools, upon making their needs known to the public, are given trade or professional journals, catalogs, books, reference works, and the like, which are greatly appreciated by pupils and teachers. There is reason to believe that pupils should be encouraged to use a large variety of reference material and that they should use these materials frequently as a means of increasing their knowledge and interest in school activities.

By getting pupils, each in turn, to keep a suitable record of when reference material is lent to a pupil and when it is returned, the instructor will be spared many minutes that he can use effectively in teaching.

(6) *Safety and first-aid.* There are many details of management that have a bearing upon safety. Few things are as impor-

tant as the responsibility that rests upon the instructor to take every precaution that can reasonably be taken to promote safety consciousness, safety knowledge, and safety practices. But whereas the responsibility for these lies with the teacher, the teacher can delegate certain specific functions to pupils.⁶

School policies differ considerably about what should be done in case of accidents. In some instances teachers are expected to administer first-aid only for very minor injuries, such as scratches, cuts, and bruises. All other injuries are referred to the school clinic, which has a trained nurse or a doctor in charge, or the cases are handled by hospitals or by private medical practitioners.

The emphasis should clearly be on preventing injuries by reducing the hazards in every possible way. Pupils should be given every opportunity to work in a congenial, social atmosphere but it should be evident to all that the school shop or laboratory is no place for "fooling," for playing practical jokes, or for throwing chalk erasers or other objects when the teacher's back is turned, for these jokes may easily result in injury that may leave life-long effects.

Instruction in first-aid is so universal in its values that little need be said in favor of such education. Some shop teachers, either personally or through someone else who is well qualified, give systematic instruction in first-aid. This is done for several reasons; one of which is that some unforeseen emergency might arise in the school in which such instruction would save suffering or even human life, and another is that the schools should give this training for its value in out-of-school situations. Whether this training is left for the school to perform or whether it should be left to other agencies, such as the Red Cross, the Boy Scouts of America, or the local fire company, can best be determined on the basis of local conditions.

In some schools a pupil is selected to act as "safety engineer" or safety foreman. His job may consist of checking upon known hazards, such as the use of guards on machinery, proper work-clothing that helps to reduce injuries, the use of goggles when grinding or chipping, keeping the floor free from obstructions or

⁶ Axel J. Kise, "Woodworking Machinery and Safety," *Industrial Arts and Vocational Education*, February, 1935, pp. 60-7.

shavings that may cause pupils to slip, inspecting tools to see that they meet safety standards—battered cold chisels and star drills are samples of tools that are not safe. He may also be responsible for checking possible fire hazards. He should prevent pupils from improperly disposing of oily waste and rags soaked in volatile liquids that may cause spontaneous combustion. Familiarity with common types of fire extinguishers and the advantages and limitations of each is also helpful to him.

(7) *Shop clean-up.* The practice of having pupils clean up work-benches, machines, and the shop is founded in part on the belief that it has a good effect in that it teaches pupils habits of order and cleanliness. It also probably has a salutary disciplinary value and since all pupils are treated alike it tends to make for a democratic spirit and for respect for such work, lowly and unpretentious though it be.

Whether pupils shall clean only the benches and machines, or also sweep the floor, will depend to some extent upon local policy and the amount of janitorial service that is provided. It will also depend somewhat upon the type of instruction given, the length of instructional periods, and the hazards that may result from insufficient care of that sort.

Proper care of school shops and laboratories is imperative. School health, sanitation, and safety may all be involved in the care and clean-up schedules that are worked out. The amount of such work that falls to each pupil is small.

There is distinct educational value in teaching pupils to start their work promptly and to put away their tools and their work, to clean the shop, and to wash up without the loss of time. Tests have been made that indicate that the time commonly devoted to these functions can be shortened to advantage when the members of the class are taught how to perform their functions in an efficient, cooperative manner.

4. *Selecting and developing group leaders.* Much of the teacher's effort is devoted to developing initiative, resourcefulness, and leadership ability in pupils. It is of course obvious that we need people who can follow worthy leaders as well as those who will exercise great leadership. But we may all lead in some ways and support approved leaders in other directions. The

teacher's efforts in the way of developing leadership abilities may be regarded as being in harmony with the social aim of developing each individual as fully as possible in order that he may cooperate with others toward the realization of goals that will make life richer and more worth while.

Self-determination and free will are at once a blessing and a burden. If rightly used, initiative will broaden and enrich personal experience; if unwisely handled, it will thwart and limit human development. In starting plans of pupil participation in class management activities, it is considered, by many, wise to select rather carefully the individuals who will first take on management functions. Some teachers prefer to appoint those who will serve in positions of leadership, rotating the appointments so that all will share them. Another plan is to have the class elect these individuals. This plan has certain advantages and also certain limitations.

It is wise to provide that each leader shall train his successor who, in many instances, will serve as an assistant for a time. In case the responsibilities taken over are so simple that an assistant or helper is not needed, the pupil in charge may be asked to explain the nature of the job to the individual who replaces him.

A plan describing how pupils are enlisted to assist in shop management and how they are given opportunities for developing managerial abilities is reported by Jenkins.¹ His plan is worked out for an industrial arts program providing for about sixty boys who are enrolled in five general shop classes. The three activities taught each of these groups are, electrical work, wood-work, and drawing. He uses a foreman and an assistant foreman, who are elected by the class, and a clerk for each of the three activities mentioned. The clerks look after reference material, supplies, tools, and the like. The instructor appoints the clerks. The importance of these jobs is emphasized and the responsibilities involved are stressed so that the pupils look upon the positions as ones that are to be desired. They carry out their duties whole-heartedly and with eagerness. By arranging for rotation

¹ James C. Jenkins, "General-Shop Organization," *Industrial Arts and Vocational Education*, December, 1936, pp. 374-5

in both the elective and appointive jobs, some of the experiences are made available to practically all the pupils.

5. The teacher as a business manager. The nature of industrial arts and of trade or industrial education is such that the instructor usually has a number of responsibilities of a business nature. They include such duties as: (1) requisitioning supplies and equipment; (2) working out a budget; and (3) financial accounting.

(1) *Requisitioning supplies.* Requisitions for supplies are frequently made out in triplicate or quadruplicate. The forms are often printed on paper of different color which is helpful toward sending the proper copy to the purchasing agent, the supervisor, director, or principal, and for retaining the right copy for the teacher's files. To prepare the requisitions involving hundreds of dollars' worth of supplies and equipment is no simple task. In some school systems the procedure has been greatly simplified for the teachers through carefully prepared lists of standard materials of known quality which are kept on hand in the supply department, or which are ordered as wanted. Since the school district can save money by purchasing in larger quantities, teachers are urged to order the same kinds of consumable supplies and tools and equipment in so far as it is practical to do this. From many standpoints the greatest difficulties in making out suitable requisitions fall to the lot of the new teachers who secure their first teaching position in the smaller districts where the practical arts or vocational activities are new and where specially trained supervisors or directors are not at hand to assist them. In such communities, furthermore, the local stores may not carry the articles needed so that first-hand inspection is difficult.

It is very important that each item shall show exactly what is wanted. Merely to specify varnish, lacquer, enamel, hammers, saws, pliers, chisels, and the like, without indicating the exact make, color, size, style, or other essential qualities, is certain to lead to difficulties. And the unfortunate part of it is that the pupils and the teacher will suffer as a consequence. The larger requisitions, if not all of them, are usually given to the lowest bidder. When specifications are not clear it may be anticipated

that some dealers are likely to supply the lowest priced item meeting the inadequate requisition in order to secure the order.

As a first step toward writing suitable requisitions, it is urged that the teacher keep a reference library of trade catalogs, trade journals, trade literature, and professional periodicals in such condition that ready access to the essential facts can be had quickly. A continuous study of such reference material, together with observation, experience, and discussion with others who use such supplies or equipment, will eventually give that thoroughness of knowledge about materials, tools, and equipment that makes wise selection and economical purchasing possible.

It is a common practice to make out an annual requisition which will cover all, or as many as possible, of the needs of the department or class for the year. This calls for careful analysis and intelligent requisitioning. In some instances the annual requisition must be supplemented rather continuously because the nature of the supplies needed could not be anticipated with exactness. Under this head may come vocational shops of various sorts, such as automobile-repair shops, print shops, and other shops doing more or less production work.

In addition to requisitions originating with the teacher, there may be those that pupils are required to prepare which will show the quantity, kind, and cost of the materials that will be required in the projects that they undertake. By requiring these to conform to generally accepted standards the pupil readily learns how such matters are handled in adult life. Neatness, correct mathematical computation, good grammar, correct spelling, and the essential technical vocabulary can be developed as by-products of the practice of making out such job requisitions and specifications.

(2) *Working out a budget.* The budget for a given activity, school shop, or laboratory is often worked out jointly between the teacher and the school supervisor or administrator in charge of that area of education. Once the instructor knows the limitations within which he must plan the expenditures for his field of major interest, he can intelligently weigh the relative cost and the relative need for each enterprise or unit of learning that must

be evaluated. Sometimes teachers are asked to prepare a budget where no similar one has been in effect in their school. Such a situation should be anticipated. All teachers should be prepared to fulfill such a requirement competently. With the course of study as a basis, and with job analysis technique as an aid, the probable cost of operating a given class for a specified length of time, such as the year, can be figured rather accurately in so far as the known activities are concerned. In some cities records over a period of years are available which show the cost per pupil hour of instruction for the various types of education. This serves as a basis for estimates for the future.

It is always wise to be as well informed as possible concerning cost data. Within recent years no teacher problem was more common than the difficult one of conducting over-size classes on curtailed budgets.

(3) *Financial accounting.* In many industrial arts and vocational industrial classes the instructor receives money from pupils for supplies used for personal projects, or from persons for whom service is rendered. Where this is the case it is advised that carefully written records be kept of each item, for laxity in such matters is likely to result in suspicion and criticism. Where possible, it is desirable to have pupils make their payments to the office of the purchasing agent, or to a business secretary or clerk. In any case, business-like procedures should be used. Individuals may well be given receipts for money paid just as is the practice in some retail stores and business establishments.

Whether pupils should pay for materials for personal projects at the time they are issued or after the project is completed is a debatable question. It is probably more business-like to do the former and easier to do the latter. Some pupils cannot advance the price of the materials at the outset but can secure it before the job is completed. When the practice is followed of having the costs paid when the project is completed, some jobs may be left in an unfinished state, or even in a state of completion, by pupils who could not pay for the material. During years of economic dislocation such instances increase in number.

A petty cash account is very convenient and quite necessary at

times. Small items costing a few cents are often needed at once. In school systems where everything purchased must be obtained on requisitions, ways may be found that will enable the teacher to secure the needed item at once with the understanding that the requisition will be issued in due time. Financial accounts should be kept in record books, the pages of which are not likely to become lost. The ordinary loose-leaf notebook is considered less satisfactory than the record book having a sewn back.



FIG. 11. How electrical equipment is stored in a junior high school storage room

When the teacher begins work in a new school he should find out whether or not all the bills originating in the department he is taking over have been paid, and be, in turn, at the close of the year should leave all financial records in such condition that it can readily be seen how the funds, passing through the department, have been used or what disposition has been made of them.

6. Reducing losses. The instructor as a manager is responsible

for lowering the costs of operation by reducing, if possible, losses of various sorts. These may be grouped as losses through wear and misuse, losses of material or supplies, and losses of tools and equipment.

Losses growing out of normal wear are inevitable, but through proper care, such as adequate lubrication, preventing overloading on power machinery, and spotting trouble before serious damage is done, substantial savings can be realized.

By developing the right mental attitude toward all property, both public and private, an approach can be made that is likely to reduce the losses that are properly charged to misuse. Misuse may be the outgrowth of ignorance or it may be intentional. In some instances equipment is misused because pupils are careless. Such an individual should be watched closely. He may not fully realize the harm that he has caused or is about to create. An explanation of the facts with constructive suggestions as to how the equipment should be handled will often suffice. Appropriate commendation for effort and faith in the uprightness of most pupils bid fair to bring better results than negative methods of control. On the other hand, it should be realized that young people are in the process of developing ideals and habits and they should not be exposed to unnecessary temptations, such as lax methods of checking on supplies and equipment.

All tools belonging to the school should be stamped with steel dies or should be etched, painted, or marked in such a way that it is clearly evident that they are school property. It is also desirable to stamp or label them so that pupils will not exchange their own for others on another bench or in another's tool kit because these are in better working condition. In marking hand planes it is desirable to stamp the plane-blade as well as the body of the plane. There are certain tools and supplies that are more highly prized, by boys, for home-craft activities, than others, and special arrangements may be made concerning their use so that the temptation to "borrow" or take them is reduced.

Teachers have learned that school pencils and paper can be conserved by issuing them systematically. In the various shops, materials can likewise be given out in ways that will reduce waste.

Teachers of sheetmetal work find that solder can be saved if given out in small quantities. In departments using varnishes, lacquers, and enamels, it has been verified, many times, that such materials are conserved if purchased in quantities corresponding to the amounts used. In other words, in industrial arts departments where the projects are small, the finishes should be purchased in small containers as the loss through evaporation might be as great as the amount used on projects. In woodwork departments short lengths of lumber, ply-wood, inlay, and veneer may be purchased at reduced prices. Pupils should not be permitted to cut up long lengths of materials when short ones are available and adequate for the jobs in hand.

7. Eliminating distractions. The school shop should be a pleasant place in which to work but it should, above all else, be a place where learning is pursued arduously and effectively. As a manager, the teacher must see to it that disconcerting and distracting conditions or practices are eliminated or reduced to a minimum. Toward this end it is the practice of some teachers to explain briefly and in simple terms what they believe to be essential practices that will work out to the best interests of everyone. A few general principles of conduct may be presented, and a few simple rules or regulations may be brought to the attention of the group. The following ones may be suggestive:

- (1) Pupils should feel free to discuss their work with one another, and they may help each other, but there should be no loud or inappropriate talking.
- (2) It is very important that all pupils cooperate wholeheartedly in enforcing all safety practices. Violations of safety regulations cannot be tolerated.
- (3) Since "fooling" is distracting and may also cause accidents, such behavior is contrary to the best interests of the group.
- (4) Pupils are asked to refrain from chewing gum during school hours.

The noises that represent serious, purposeful effort are not distracting. As a matter of fact it appears that they tend to stimulate pupils to greater effort. So one must have standards for conduct in the laboratory and in the school shops that vary from those appropriate to the classroom and the study hall.

8. Concerning pupil movement. From what has previously been said it may rightly be inferred that pupils should be encouraged to act as naturally and as cooperatively as if they were at scout camp, or as if they were carrying out a group enterprise in the world of work. The emphasis shall be on socialized management technique rather than upon unnecessary artificial restraint and autocratic regimentation. It may be wise to keep a check on how frequently pupils leave the room, but this can be handled easily in a routine way. In some schools the pupils need not ask permission to leave the room—they merely fill out a slip upon which they sign their name and indicate the length of time that they were out. In other schools individual permission is given.

As a means of reducing unnecessary loitering in halls and also as a means of identifying strangers who might be in the building without the knowledge of the school authorities, some schools have relatively large wooden paddles upon which is painted the number of the classroom or shop. When a pupil leaves the room during work-hours he carries this with him.

Teachers usually assist in maintaining order while classes pass from room to room. Pupils sometimes assist also. This system helps to reduce accidents and enables large numbers of individuals to reach their destination quickly. The pupils may be organized as guards, monitors, or captains. They often wear an emblem to designate their position or function.

9. Pupil grouping. In many shop classes conducted on a trade basis it is standard practice to divide the class into small groups varying from two to a half-dozen pupils each. This arrangement may be a regular procedure or it may be used only occasionally, depending upon circumstances. It has been found that some kinds of work can be carried on best under such a plan, and the procedure is also rather typical of what one finds in industry.

Usually the leader or foreman is held responsible for the job that is to be done and for tools and materials as well. Working under such an arrangement is life-like and helpful for the occupational life that lies immediately ahead. The pupils learn how to coordinate their efforts—how to work together as a team.

Such an arrangement is not limited to vocational education,

for it can likewise be used to advantage with industrial arts and other practical arts groups—but less frequently.⁸

Another type of grouping, namely ability grouping, was briefly mentioned in Chapter II. Among the advantages claimed for it for purposes of general education, which may or may not be valid for practical arts and vocational education, are the following:⁹

- (1) Homogeneous grouping makes differentiation easier in courses of study.
- (2) Methods of instruction can be better adapted to groups that are relatively uniform in ability.
- (3) The slower pupils are not discouraged by what the more able ones do.
- (4) Competition is keener within homogeneous groups, than where the range of ability is greater.
- (5) Ability grouping lessens pupil failure.

Arguments against ability grouping can be briefly summarized in the following manner:

- (1) The less able pupils are deprived of the stimulus of those more competent.
- (2) A failure attitude is sometimes developed by pupils who are put with a group of low ability.
- (3) A superiority complex, quite detrimental to their best development, may be developed by some pupils in the high-ability group.
- (4) Ability grouping is undemocratic—the range of ability in all vocations, including the professions, is great.
- (5) It is very difficult to divide pupils into groups that are truly homogeneous. Obviously grouping on the basis of intelligence alone will not result in ability grouping where such specialized aptitudes as mechanical ability are essential.

10. Checking is necessary. In an earlier part of this chapter ways have been suggested for using pupils in connection with such responsibilities as issuing instructional materials, tools, and supplies and in taking care of the school shop. Whereas the pupils

⁸For a modification of this plan see R. Randolph Karch, "Organizing Print Shop Production," *Industrial Arts and Vocational Education*, July, 1936, pp. 210-11.

⁹See Department of Superintendence, *Ninth Year Book: Five Unifying Factors in American Education*, Washington, D. C., NEA, 1931, pp. 121-6.

usually measure up in splendid fashion to the responsibilities imposed on them, it cannot be taken for granted that the instructor can safely forget about the many details involved. As a matter of fact, he is wise if he will check results frequently and with care. To illustrate, the toolroom clerk may be eager to do his work well, but it may be necessary for the instructor to step into the toolroom at the close of each period to make sure that everything is as it should be.

Checking is particularly necessary where pupils undertake projects that involve new and relatively difficult or complex experiences, and when the materials are expensive.

In order to avoid accidents constant checking is likewise required. Pupils are provided with but one set of fingers, and it is better to know that all safety requirements are being met than to depend entirely upon immature pupils.¹⁰ The pupil safety foreman should perform his task as best he can, but in addition to this, the instructor will want to keep a watchful eye upon shop hazards.

Some pupils must be checked much more often than others in order that they may be held closer to their best attainments. Whereas the goal is to develop self-reliance in all pupils, common sense indicates that this is realized only through long-repeated effort.

11. Securing suitable work. In order to make schoolwork as interesting and educational as possible, teachers and administrators of practical arts and vocational education bring to the school projects or types of work that enrich and vitalize the course-content. These work-jobs are selected with due regard to the objectives of the courses taught and with proper consideration for the maturity and ability of the pupils. The most important factor in selecting such work-jobs is their educational value and their appropriateness at the time.

With trade classes the standard requirements and "limits" of workmanship as they hold in industry are met; in industrial arts classes the standards appropriate to non-vocational education

¹⁰ Percy H. Heron, "Every Job Can Be Done Safely," *Industrial Arts and Vocational Education*, September, 1935, pp. 249-52

are observed. Whether the school should charge for work that is done, whether it should be charged to "good will," or whether it should be exchanged for supplies or materials that the school could use to advantage will depend upon circumstances. No hard and fast rules can be proposed that will always hold. In some instances pupils are in a position to bring a number of good, appropriate work-jobs from home—this is particularly true in industrial arts. If instructional supplies are rather limited, as they often are, such ways of supplementing the types or ranges of educative experiences of pupils are especially necessary.

In looking for work having educational value for one's classes, it is suggested that the feelings of the community be respected. If work for adults is scarce in the area, production work in the schools should be arranged so as to recognize this; if there is strong public sentiment in favor of, or against, certain types of instruction or ways of conducting it, that too deserves to be respected.

12. Relations to the community. The schools need the active support of the home and of the community. Parents, in progressive school districts, are no longer looked upon as patrons but as partners—and vitally interested ones. As a manager the teacher is interested in the parental points of view and in the way community groups regard education. Community standards and modes differ from place to place. In some places it weakens a teacher's influence if he dances or plays golf; in others it has the opposite effect. In view of this it would appear to be desirable to know one's community and to be governed by the circumstances. After one is well known and has the confidence of the community one can do many things that would be hazardous for a stranger. Obviously some communities are much more provincial than others. Although teachers have the same rights as other citizens, we must not forget that, in the main, the parents expect teachers of their children to exemplify modes of conduct and personality traits that are clearly above the average.

13. Some evidences of good management. As a means of evaluating good school shop management the following self-rating scale is suggested.

Item	Description	Good	Fair	Poor
		8 to 10	6 to 8	Less than 6
1.	The atmosphere of the shop is one of interested activity.			
2.	Socialized management techniques are employed.			
3.	The general appearance of the shop is orderly, neat, and well arranged, as judged by appropriate standards.			
4.	Safety practices are carefully observed.			
5.	Tools are in good order and well arranged.			
6.	Supplies are kept in suitable ways and are issued efficiently.			
7.	Room temperature is kept between 65 and 70.			
8.	Natural and artificial light is regulated to suit the requirements.			
9.	Ventilation is regulated in proper manner.			
10.	School property is not defaced through writing, carving, or misuse.			
11.	Fire hazards have been reduced to a minimum.			
12.	Suitable individual and group records are kept of pupils.			
13.	Essential tool, equipment, financial, and statistical records are kept.			
14.	Reference materials are adequate and well kept.			
15.	Projects, wraps, books, and personal property are kept neatly.			
16.	Machines, benches, blackboards, chalk trays, and floors are kept clean.			
17.	Visual and sensory aids are available.			
18.	The teacher is looked upon as a helper and guide rather than as a boss or dictator.			

PRACTICAL SUGGESTIONS FOR TEACHING

The items that follow are listed, not as a means of summarizing the contents of this chapter, but more in the spirit of suggesting a few additional points that appear to be worthy of further reflective thought on the part of conscientious teachers.



FIG. 12. How equipment, tools, and supplies are kept in a toolroom in one of the Philadelphia senior high schools. Steel cabinets with adjustable shelves are very desirable

1. Management, in education, is not to be regarded as a goal but as a *means* toward certain desirable ends, such as purposeful, thought-provoking, or skill-instilling, efficient learning.
2. Management is at its best when it is natural, impersonal, unpretentious, and democratic.
3. Challenging, constructive, socially useful work is the key to successful pupil management. Negative and restrictive measures are of relatively little value.
4. Pupil participation and control usually operate best when guided by experienced adults.

5. Management techniques are brought into play in order that wasteful procedures and practices may be replaced by more efficient ones.

6. Self-control, social insights, habits of cooperation, and leadership ability develop gradually. They must be forged out upon the anvil of life experiences, which include, but are far broader than, school experiences. One must not expect too much of youth. Great teachers have much patience as well as superior ability.

FOR DISCUSSION

1. Cite one or more cases illustrating the difference between democratic and autocratic class management.

2. Discuss the relative points of strength and weakness of a perpetual inventory system as compared with a seasonal one.

3. Compare the advantages of a toolroom with those of: (1) wall boards; (2) open shelves or cabinets, (3) closed cabinets or closets

4. Explain your personal convictions concerning the practice of having pupils sweep shop floors.

5. If the heat or ventilation, which are assumed to be under the control of a custodian in the building, are out of order in your room, to whom should this be reported? Explain.

6. Whose job should it be to: (1) oil machinery; (2) re-condition tools; (3) repair belts; (4) replace broken windows; (5) make stage scenery.

7. Is it good practice for the teacher to step out of the shop when power machines are in operation?

8. Describe and illustrate how a class progress record sheet should look that is suited to shop instruction.

9. Make out a form for a bill of material and describe its advantages.

10. How would you keep the reference material in the room or shop in which you have special interest?

11. Discuss at length the various view-points that must be considered in arriving at a sound policy relating to first-aid in school shops.

12. Should group leaders be selected by the teacher or should they be elected by the class?

13. If a dealer should intimate that he would "make it worth your while" to place orders with him, what would you say or do about it?

14. Mention several ways in which teachers sometimes waste time in teaching and suggest how it may be avoided.

15. Suggest ways in which time may be saved in starting shop classes and in putting away the work and tools at the close of the period.

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CHAPTER VI

MOTIVATING LEARNING

HOW TO DEVELOP INTEREST AND ZEAL IN LEARNING

1. Interest as a basis of learning. It is generally believed that whole-hearted, effective activity is impossible without the drive that is associated with genuine interest in the thing to be done. Learning is no exception to this. It has long been recognized that we learn most easily, most quickly, and most thoroughly, other things being equal, when we strongly desire to learn—when we have a compelling interest in doing something. Then all else, for the time being, pales into insignificance, and we attack the project with energy and vigor. Many learning experiences, both mental and motor, require extensive repetitive practice. This, in and of itself, would become very tiresome and annoying were it not for the stimulus that may be given through motives and incentives that can be used to relieve what would otherwise certainly become most distasteful and even discouraging.

There appears to be a positive correlation between interest and ability. Mursell reports that the correlation between interest and ability in a study made of pupils who were asked to express their degree of interest in a subject, and whose interest rating was then compared with their achievement, showed a correlation of 0.70 to 0.89. This may be interpreted to mean that high marks will not necessarily go to those who have strong interest in a given area of learning, but, other things being equal, one's best chance of superior achievement lies in activities in which there is a genuine interest.¹

Another study of the relationship between interest and learning tends to throw doubt upon the validity of the commonly accepted notion that there is much relationship between interest and learn-

¹James L. Mursell, *The Psychology of Secondary School Teaching*, New York, W. W. Norton and Co., Inc., 1932, p. 441

ing. Betts and Van Duzee show that there is practically no relationship between interest and ability to learn the technical vocabulary used in industrial arts education. The authors themselves point out that their finding should be regarded as tentative.² The chief reason for this is that a vocabulary test may not be an adequate measure of learning.

2. Motivation defined. In the strict, as well as in the popular sense, the word "motive" refers to that which arouses movement. But broadly and scientifically considered, "motives" include much more than this. *From the standpoint of education motivation is commonly regarded as stimulating individuals to educative activities.* Motivation, however, should be thought of in terms of the individual's total environment and his entire native endowments rather than merely as special devices or clever procedures employed by teachers to stimulate learning. Under normal conditions it is difficult to prevent persons from learning—if one should be so unwise as to attempt it. There is an array of strong, race-old behavior tendencies or natural urges or drives to activity, supplemented by a host of external or environmental stimulators, which, independently at times, and on other occasions in unison, stir us to action. Merely to be in a given environment may be more stimulating than words of well-intentioned parents or of considerate teachers; and, likewise, the strong influences of organic origin may also prove stronger than teacher-devised procedures.

In order to appreciate what is involved in motivating pupils to educative efforts one must, therefore, understand original human nature as it interacts with environmental forces. One must likewise keep in mind the basic laws of learning, namely: (1) The law of readiness; (2) the law of exercise—or of use and "disuse" as it is sometimes called; and (3) the law of effect. The supplemental laws of learning must also be borne in mind.

It has been suggested that the term "motives" be applied to stimulating conditions or factors that are of internal or organic origin, such as desires, objectives, goals, and attitudes, and that the term "incentives" be used for stimulating factors emanating

² Gilbert L. Betts, and Roy R. Van Duzee, "Interest and Learning," *Industrial Arts and Vocational Education*, Vol. 25, No. 5, May, 1936, pp. 135-8.

from the environment or externally.³ The current literature dealing with motivation reveals no general conformity, as yet, to this suggestion. It may be a bit difficult to draw this distinction at times since the origin of the motive may not be clear.

3. Motives are complex. It is a commonly accepted fact that all forms of human motivation are exceedingly complex. The noblest deeds of courage and heroism may be inspired by very ordinary motives; and acts of misdemeanor and crime may have back of them motives that are in part commendable. In order to understand and properly interpret human action, one must constantly consider the motives that lie back of it. Acts of violence performed with certain motives are praised as patriotism and under other circumstances are punished as treason. The difference lies chiefly in the motives that were the source of the acts. When the interpretation of a law is questioned, it is customary to look into the original purpose or motive that was in the minds of those who framed it.

Motives are not only very complex but they are also exceedingly numerous and defy accurate analysis. Thomson says that there appears to be no constant factor and that the variables are many and perplexing.⁴ What we adore today we may dislike tomorrow; what appears all important to us at the moment may be uninteresting a little later. Sometimes motives change little through the years and at other times they are as changing as the autumn breezes. Much of what we do is controlled by unconscious impulses and by motives that are quite indefinite.

4. Importance of motives. The importance of motivating human behavior is everywhere apparent, and the results are fairly obvious. One may examine the common practice in industry, where a bonus system is employed, to see how it influences the amount of effort put forth by workers, or one can note how piece-work increases production in the mill or factory when the rate of pay is a fair one. For the sake of securing publicity and approval many persons have risked their lives or have undergone untold privations and hardships. Intricate and complex though

³ P. T. Young, *Motivation of Behavior*, New York, John Wiley & Sons, 1936, p. 45.

⁴ M. K. Thomson, *The Springs of Human Action*, New York, The D. Appleton-Century Co., 1927, p. 6.

the motives may be, they are the most powerful forces in human behavior.

Motivation is important educationally for a number of reasons, some of which are the following ones:

(1) *It calls forth greater effort.* The greater interest and effort stimulated through motivation will result in increased learning practice. Motivation lengthens the time of activity; it adds to the staying power that helps to overcome obstacles.

(2) *Makes effort more enjoyable.* When one sees beyond the routine tasks in hand to the objectives or goals that motivate action, one learns to associate satisfaction with what would otherwise be uninteresting activity. Words of commendation, or approval of one's fellows, whether expressed directly or by implication, likewise make effort more worth while to us.

(3) *Makes failure more annoying.* Who has not extended his efforts because not to do so would prove annoying, embarrassing, or painful? Pupils will often work hard in order to avoid implied or expressed disapproval from those whom they respect or regard highly.

(4) *Stimulates a variety of responses.* Among the responses stimulated by motivation are those that may result in better methods of doing things. Thus properly motivated pupils will show more initiative, more creativeness, and more adaptability in learning than can be expected without motivation.

5. Sources of motives. It has been pointed out by Ragsdale and others that motivation has been traditionally associated with instincts and emotions, but that an increasingly large number of psychologists are dissatisfied with that interpretation.⁵ He would base motivation upon the nature of the learner and to this end would stress the importance of understanding pupils as individuals and as a group.

Gestalt psychology looks upon motivation as a matter of "insight." Appropriate activity then would begin when the pupil accepts the goal proposed or set up by the instructor. Such goals would have to be selected so that they are not too difficult and

⁵C. E. Ragsdale, *Modern Psychologies and Education*, New York, The Macmillan Co., 1932, pp. 193-8.

not too remote, for otherwise failure or lack of interest might defeat the results hoped for.

Thomson holds that whereas the instincts do not account for all the springs of action, they do account for an appreciable proportion of human activities. Although all instincts are influenced constantly by habits, and although they are being modified continually through social pressure, despite such limitations, instincts are prime movers of consequence.⁴

The extensive use of incentives and rewards, on the one hand, and correction and punishment, on the other, give evidence that there is a wide-spread belief in the motivating effects of feeling.

Ideas are likewise important sources of motivating learning. Some ideas are more dynamic and creative, in type, than others, so that the motive force of ideas may be thought of as being proportional to their quality of stimulation to mental, motor, or emotional response.

Social pressure is a powerful motivating force. Most people desire the approval, good will, and affection of parents, friends, and others. Our happiness is to a large extent conditioned upon getting the approval of those with whom we live. Both indirect and direct social pressures operate to motivate learning.

That economic motives strongly influence learning is generally accepted. The phrase, "Necessity is the mother of invention" is but a way of saying that, when hunger, thirst, or other urgent needs prevail, the normal response is to learn to satisfy such wants. The economic motives that stir men to action may be socially valuable or narrowly selfish and anti-social. The profit motive in business is very different from the motive that leads the medical man or the teacher to share what he knows in the interests of service to others.

Psychoanalysis holds that subconscious motives play an important part in life. Freudian psychology teaches that hidden wishes or desires may be very far-reaching and powerful in their effect.

The sources of motives that have been mentioned in these paragraphs represent far from a complete list but they will at least make evident what was indicated earlier in this chapter, namely,

⁴ Thomson, *op. cit.*, p. 81.

that the sources are very numerous and motives are exceedingly complex. By inference, the motivation of learning calls for thorough professional training. To know how to do something is one thing; to stimulate others to learn and to like learning is quite another. The complexity of motivating learning should be a challenge to master the art more fully in the interests of better teaching.

6. Motivating manipulative learning. It might be assumed that learning which calls for much movement or manipulative activity would be self-motivating, but this does not appear to be true. It is of course quite obvious that shopwork and laboratory work, in which the progress of learning is largely evident, and which call for a combination of motor and mental activity, are easier to motivate than are abstract and subjective types of learning. But it will likewise be evident that much repetition, such as is often required to attain the desired degree of doing skill, may become very tiresome and monotonous. Motivation, then, for learning of the motor type is very necessary, if best results are to be secured. This may be done in part by carefully determining the nature of the work; by wisely regulating the time of any unit of work or of the kind of activity according to the maturity, strength, and ability of the pupil; and by giving suitable recognition to successful accomplishment in each stage of the process. It is far better to have frequent checking levels, the successful completion of each of which may call for a word of approval, than to expect the pupil to complete the entire project before being given any encouragement.

7. Motivating the drill lesson. Many hand skills, as well as knowledges acquired, must be subjected to repeated drill in order to increase the degree of skill or to overcome the effects of forgetting. The drill lesson may be on an individual basis or on a class basis, depending upon circumstances. In either case, the first step is to motivate the drill that is to take place. This may be done by showing the need for repetition. Where objective measurements are possible, as in the shop, drafting room, or laboratory, the matter is simplified. Pupils can readily check the accuracy of the work they do and also the speed with which it is done. But in mental processes this is not so easy because the

results are less tangible. Samples of objects that meet the desired standard are helpful as are also rating scales showing work arranged in an order of merit. In vocational education statements of the degree of proficiency required, as given by people from the vocation under consideration, are helpful.

Competition, such as that of a pupil with his past performance, between pupils in a class, or between the pupil and a larger group may serve as a stimulus for drill. A similar effect may also be brought about through contests and through exhibits.

8. **Motivation through the assignment.** There is general agreement that efficient, whole-hearted learning may be expected only when lesson assignments are properly made. It should indicate very clearly exactly what is expected of the pupil, and the lesson or project should be motivated with care. It is believed that most lesson assignments are made too hastily, often when the pupil's mind is distracted by thoughts of what is to be done when the class is dismissed. Few things are more conducive to poor motivation of assignments than the attempt to do that important aspect of teaching in too hurried a manner at the last minute.

Merely to say to a student, "see the next job sheet," or "take the next project as given on the blue-print on the wall," can hardly be considered adequately motivating a lesson in shop instruction. To say in the science laboratory or drafting room, "when you have completed this problem take the next one given in your text," is obviously equally unsatisfactory. The method that is to be employed for motivation purposes will depend upon many variable factors. It should always be adapted to the specific situation in hand. It may be necessary, at times, to depend upon written instruction sheets for motivation of instruction presented in them, but it would appear to be good practice to supplement this orally.

9. **Motivating through socialized instruction.** A more complete discussion of socialized instruction is reserved for another part of this book, but it may be appropriate here to call attention to the fact that there is a distinct stimulus to learning when pupils are led to work together cooperatively as is typical in practical arts and vocational classes, and as is typical of the world of work outside of schools. Motivation may, and frequently does,

come from inter-relationships with others. What others do, say, or imply by word or deed may strike hidden springs of latent motive power which are released for activity when the conditions are right. It is difficult to be inactive when others are active. Enthusiasm as well as the play tendency is contagious. When others strive hard to learn or to achieve—for pupils think more in terms of goals than in terms of learning—it creates an irresistible feeling in the onlooker—he usually wants to do what the others are doing. Working together in democratic, life-like fashion



FIG. 13. A corner of a junior high school shop showing printing equipment. A hand-operated press such as the one shown is relatively inexpensive and requires but little space. Printing and other forms of industrial education help to motivate "academic" education.

is both natural and stimulating. Strong behavior tendencies are brought into play through such cooperative effort. In other words, it calls into action the natural inner urges to supplement the artificial incentives, which likewise may be employed as devices, to make learning earnest and efficient. Pupils like to have the opportunity to learn in a natural setting; they like to discuss common problems, pass on a word of caution or of help to one another, assist each other, and receive encouragement. All these activities and many others are definitely motivating—and what is equally important, they function in adult living.

10. Posters and charts for motivation. An interesting description of how general interest may be aroused through saws and maxims that relate to practical arts and vocational education is

given by Olson and Hunter.⁷ It consists in using posters, such as are made in art departments or school print shops, that present interesting and worth-while sayings which may influence human conduct. The following are samples: (1) "It hurts to get hurt. Be careful." (2) "Good steel withstands much hammering." (3) "Every artist was first an amateur." It is suggested that such posters be changed daily so that pupils will develop the habit of looking for them.

A somewhat similar plan is used by progressive teachers in many places. It consists in encouraging members of the class to bring for the class bulletin board current newspaper and periodical clippings pertaining to the area of learning being pursued. Thus the trade teacher's bulletin board will contain interesting references to his field, the industrial arts teacher's will show data pertaining to the industrial arts, and the bulletin board in the science laboratory will portray recent developments and interesting comment about contemporary science. Commercial charts and process-of-manufacture displays likewise stimulate learning. Some of these can well be made by pupils. To illustrate, pupils can be encouraged to bring samples of many different kinds of tacks, brads, nails, spikes, screws, bolts, special types of fasteners, and forms of hinges, which can be mounted artistically and can be used effectively to motivate and vitalize learning. Similar displays can be developed for each type of shop and laboratory education given in the school.

Prints of the outstanding leaders in any area of endeavor may be mounted on filing cards. They can be used in an effective way for the bulletin board, in the reference library, and in class discussions.

11. Models and samples. Everyone is interested in the progress man has made in various lines of activity. Some teachers are using models and samples very effectively as a spur to learning. Here is an electric laboratory in which is displayed a series of lighting fixtures, motors, conduits, etc., showing their progressive development. There, across the corridor, is an automobile shop containing many samples and parts that convey in a vivid way

⁷ Delmer Olson, and William L. Hunter, "The Silent Teacher," *Industrial Arts and Vocational Education*, August, 1936, pp. 212-4.

the fact that the automobile represents a very high degree of manufacturing efficiency. That such displays are inducements to creative learning no one will deny. And here is a print shop. On a swinging steel rack are displayed a great variety of samples of printing, illustrating many kinds of typography, secured from many countries. One may compare readily the typographic styles of various peoples living in all parts of the world with the typographic styles produced locally. One can see how other schools in the state design and execute their work in the graphic arts.

The teacher of woodwork may have displays of samples of wood, each of which shows the bark and a finished portion of the wood. He may also have other samples illustrating how different finishes look upon various kinds of lumber. And even more interesting than these, he, in common with teachers of other aspects of learning, is using specimens and projects that have been made by pupils in his classes. Surely there are few things more motivating and more challenging to pupils than such actual samples of work that others have done. Why have we not taken this fact more to heart and seen to it that our school shops and laboratories shall not be barren of such things every time a promotion period comes along?

This drawing room into which the reader is asked to look, has a panel running around it, above the blackboard, on which are displayed samples of work that pupils have rendered in various mediums. At the side of the room is a cabinet in which are kept samples of objects that can be sketched and drawn to scale by the pupils. At one side are a number of fine drawings made on *unsensitized blue-print cloth* so that they will wear well and so that they can be taken elsewhere for display purposes. A small wooden molding is fastened to the top and bottom of each, as is common with wall maps. Other drawings and photographs are mounted on stiff paper sheets which are provided with eyelets and are loosely laced to permit their being folded for storage or transportation. And so we could continue from one room or shop to the next one, showing how models, specimens, illustrations, and samples are being employed most effectively to stimulate learning.

12. Collateral reading as an incentive. Many pupils can with profit be encouraged to do more good reading than they voluntarily undertake. This would seem to be true particularly of pupils who spend much of their school time in types of instruction calling for much motor activity and who, by choice, spend much of their leisure in physical forms of recreation or play.

There are many advantages for pupils in developing correct reading habits early in life. It will increase general as well as vocational knowledge. It will clarify their understandings and deepen their appreciations. It may serve as a means of stimulating social attitudes and habits and it may also act as a motivating measure for the educational activities undertaken as schoolwork.

Definite procedures can be planned which should normally function in terms of tangible results. A plan that has been used with success in one city—and no doubt in others—consists in encouraging pupils to read the reference magazines that are available in the school shop.^{*} A special label is pasted on the magazines to encourage pupils to take good care of them. Loan record cards are kept which show the date and name of the individual who is using the periodical. A special form for reporting upon the outstanding points of the readings is also used. Reading should, of course, be encouraged on a much wider scope.

Through guiding the reading interests of pupils, the teacher may do much to develop, in learners, a taste for literature that is distinctly helpful, constructive, and worth while. There is such an abundance of cheap, trashy, worthless, and even positively harmful literature that definite steps should be taken at home and in the schools to orient the reading habits of pupils along lines known to be helpful and socially necessary. It is most important that pupils be guided to care to read voluntarily the literature that will stimulate them to creative thinking and to their best efforts.

13. Social-economic forces. Among the springs of human endeavor, of which learning is but one manifestation, few are as strong in their appeal and as rich in latent possibilities for education as are the all-absorbing, vitally important social and eco-

^{*} William J. Patlow, "Reading Trade Magazines in the School Shop," *Industrial Arts and Vocational Education*, February, 1936, pp. 58-9.

conomic forces of our day. To the extent that education can be presented as functioning toward the enrichment of life through physical security, participating toward an evolving culture, mental security, equality of opportunity, and other social-economic objectives such as were briefly discussed in the opening chapter of this book, to that degree will learning be stimulating, energizing, and challenging. To be sure these major goals must be broken down into smaller, more concrete units that are possible of realization, that are understood by the pupils, and that can be woven into the fabric of the particular area of learning that is being considered. That is precisely where the teacher's judgment and professional education come into play. Selection, guidance, and teaching must always be in terms of individuals, each of which is different from every other one.

14. *Material cultures.* The rich, priceless heritage of material cultures, such as the great examples of fine art and the outstanding pieces of industrial art, from the miniature carvings in ivory to the Empire State Building in New York City or the San Francisco-Oakland bridge, whether they be executed in stone, metals, leather, plastics, or other materials, and irrespective of age or racial origin, forms another source of motivation that seems particularly close to the fields of practical arts and vocational education. In the latter realms creative thinking, coupled with skillful and artistic expression, are emphasized. The practical arts are included in our school curriculums largely to develop appreciations, insights, and understanding of our material cultures. Not to use material cultures as motivating factors in teaching would indeed be to overlook an endless source of worthy educational drives. The fine and industrial art of all nations and the superior craftsmanship of all races are stimulating. The primitive art of the American Indian is being used more today than ever before because we see in it—and in other distinctive arts as well—elements that can enrich our modern material culture. The developments of science and the advances of modern technology are opening up vast vistas of new content material that will develop keen interest in pupils. The interest that modern youth takes in automobiles, airplanes, speed-boats, diesel-electric trains, radio, and the like is indicative of how such developments of sci-

ence and of industry can be utilized as goal-seeking activities of great educational value. Air-plane model making, speed-boat model building, glider construction clubs, and other activities conducted on a club or avocational basis may affect rather directly related learning pursued as a part of school curriculums.

15. *The urge to explore.* One of the most important purposes of industrial arts education is to provide the right setting so that young people may explore a little of the rich, vast realm of the industrial arts. The desire to work with materials and tools—the interest in manipulative activity—is especially strong in pupils who must spend much of the day in school classrooms. It represents one phase of the interest that pupils have in industrial arts. This impulse is of distinct educational value. It is a means of progress and forms the basis for adaptation to our changing environment. Consequently, good teaching will utilize this natural urge in ways that will lead to self-development, increased knowledge, improved skills, creative thinking, and social attitudes in pupils. Pupils may be guided to explore those avenues that appear to be most promising to their particular endowments and aspirations. Toward this end it would be helpful if considerable flexibility were typical of the courses of study, and it would likewise be helpful if the activities were as representative as possible of functioning adult life.

In order to utilize the exploratory impulse to advantage, the teacher will want to judge the ability and the perseverance of the pupil rather accurately, for if a task that is too advanced in its requirements be selected there will follow a disheartening lack of interest, the effects of which may linger for a considerable length of time.

In all shop instruction, as well as teaching in the classroom, the matter of fatigue deserves attention. When a particular type of activity seems to result in fatigue it is usually well to shift to another type of activity calling for different responses. For example, if a boy becomes tired as a result of planing lumber, encourage him to tackle another part of his project for a time. Fatigue is more likely to develop when the work is repetitive in nature, as for example, sandpapering surfaces, than when it

changes frequently in character, as is often the case in assembling a job.

16. **Avocational interests.** Increasing mechanization and advances in science are reducing the working hours for many. They are also making certain types of work more routine, more repetitive in nature, and more enervating so that something needs to be done to compensate for such trends. One avenue that holds promise for many is that leading to the development of avocational interests. Cramlet and Hunter have shown how the home-workshop may be organized as a community activity which will stimulate learning in the regularly organized school-shop activities.⁹ The work in the schools will stimulate the home-crafters and they, in turn, will encourage similar activities in the schools. The displays may be joint affairs or they may be separate. In either case their effect is one of radiating in constantly increasing circles, like the ripples started by a stone cast into a pool of water. The time that can be given to shop instruction in school is sometimes so short that pupils have difficulty in completing their shop projects. When the home-workshop is available, some of these projects may be completed there. Others may originate there and can be completed in school.

The feeling of comradeship and of mutual interest that normally develops when father and son or daughter do home-craft work together is a driving force that will usually stimulate school-shop instruction. There is every indication that home-craft and club activities on an avocational level centering around manipulative work are growing in popularity. Many commercial concerns are entering the field of supplying working drawings, materials, tools, and machinery for such purposes.

17. **The challenge of appreciational understanding.** In order to stimulate earnestness of purpose in practical arts education, it may at times prove effective to point out the universal need of understanding contemporary life. It may be useful to point out that in these modern days one can hardly be called cultured who does not understand and appreciate our great world of

⁹Ross C Cramlet, and Wilham L. Hunter, "The Home Work Shop Organization," *Industrial Arts and Vocational Education*, September, 1936, pp. 239-64.

work. No matter whether a boy is to be a banker, lawyer, dentist, doctor, engineer, or teacher, he should still profit from industrial arts education because it enables him to have at least a semblance of appreciational understanding about what others do. It creates a bond of mutual respect between the man in the white-collar job and the one who wears overalls, a respect which is essential in a democracy. And in a similar manner, no matter whether a girl will or will not be a homemaker when she reaches adult life, training in homemaking will still function because it will give the background of knowledge and skill that will enable her to appreciate the great variety of human planning and skill that finds expression through clothing, foods, home decoration, care of infants, children, grown-ups, and invalids, and in the task of managing and maintaining a home. Whether she becomes a housewife or not, training in homemaking will enable her better to understand and fit into family life.

Education in the practical arts enables one to get more out of life than one might otherwise. In general, one who has himself tried to work constructively in the area of the practical arts will probably value craftsmanship and artistic qualities more than is possible without such experiences. Of course one must not for a moment conclude that the schools are the sole source for such education, or that practical experiences will always develop social insights.

18. Visual and sensory aids. This topic will be reserved for more complete discussion in a later chapter of this book. For present purposes it will suffice to call attention to the wide-spread belief that visual and sensory aids to learning can be made very effective toward increasing human knowledge and skill. Among the outcomes to be anticipated are: (a) increase in initial learning; (b) increase in the permanence of learning; and (c) increase of appreciational understanding.

Among the motivating factors in using visual-sensory aids may be mentioned: (a) the arousal of interest; (b) holding attention; (c) stimulation to self-activity, and (d) resulting impulses toward group participation where that is feasible.

19. Life needs as incentives. It is commonly believed that we

should look for sources of stimulation of learning in the life needs of pupils. This is interpreted by some to mean the needs of adult life or life outside of school. Others think of life needs as any wants that are a part of life, whether in or out of school. The latter interpretation appears to be more in harmony with John Dewey's belief that education is life as well as preparation for



FIG. 14. Students at work in the modernly equipped Baking Department of Dunwoody Institute, Minneapolis, Minnesota. This is a good example of effective, functioning vocational education.

life. In other words, life needs include those that spring from school activities as well as from the environment outside of it.

The life needs of adolescents may be similar to, but not identical with, those of adults. In order to give an indication of what the adult worker in industry considers important interest factors in working conditions, there is given herewith a list of items suggested by a group of seventeen foremen who were asked to list the interest factors that seemed to them to be most important to the worker in industry. The items are arranged in the

order of importance as the foremen saw them, and they are stated in their own words:

TABLE IV

INTEREST FACTORS AS REPORTED BY ADULTS EMPLOYED IN INDUSTRY

- | | |
|-------------------------------|--|
| 1. Satisfactory wages | 5 Foreman who takes a personal interest in his men |
| 2. Good working conditions | 6. Bonus |
| 3. Proper working hours | 7. Proper instruction |
| 4. Giving a man a square deal | 8. Proper discipline |

At the risk of repeating something that has been said in similar words before, the life needs of pupils pursuing practical arts and vocational education should very definitely include instruction that will function in terms of social and economic adjustment. The new frontiers of America are largely economic and social in character. Vocational education of the past has probably stressed the economic side too much and the social one not enough.

20. **Placement as an incentive.** It is true that placement is a function that normally follows the completion of units of learning. In that sense it cannot be regarded as a motivating device for school instruction. But in another, and in a very practical sense, the successful placement of pupils who have completed their "course" of instruction acts very directly as a stimulant to those who look forward to the same stage of development in the near future. Successful coordination service between the schools and industry and effective placement and follow-up service are sure to influence the morale, the spirit, the enthusiasm, and the energy expended by pupils in schoolwork.

Under present-day conditions it would seem to be an unwarranted procedure to graduate a pupil who has not been carefully instructed in how to look for and apply for work. A number of suggestions for young people and adults are found in this connection in the growing literature that may be classified as "How to Secure a Job." The following are a few suggestions that will illustrate the content: (1) Bingham and Moore, *How to Interview*; (2) Faucher, *Getting a Job, and Getting Ahead*; (3) Graham, *How to Get a Job during a Depression*; and (4) Ryder and Doust, *Make Your Own Job*.

Shuman has called attention to a number of things that are of practical value in improving school placement service.¹⁰ His suggestions are made on the basis of first-hand experience in working as a coordinating and placement representative employed by a school district to work with industry. He believes that pupils should be taught how to seek jobs; that placement service can be extended by getting the cooperation of pupils who have been placed; and that the coordinator should be on public employment and personnel committees in order to be in touch with what is going on in his community. Photographs and essential personnel data about pupils to be placed can be kept on small cards that are convenient to carry in one's pocket.

A number of schools now give definite suggestions to all pupils who leave to go to work on what to do and what not to do when looking for a job.

21. Incentives for use with shop classes. Supplemental to what has already been mentioned about incentives, let us call attention to other devices that are suggestive for school-shop use:

(1) *The blackboard.* This is one of the most available methods of motivating instruction through visual means. To use the blackboard effectively is an art. Colored crayons add to the vividness of illustrations.

(2) *The school journey or field trip.* The "field" trip can be made exceedingly interesting and highly instructive. It ought to be employed more than it now is. When used in combination with still or motion pictures and class discussion, it becomes especially valuable.

(3) *The radio.* The educational advantages and the motivating value of the radio are being recognized more and more. A number of schools are being equipped with radio broadcasting equipment in all "homerooms" so that the entire student body can hear the message at the same time, from the school broadcasting room or from an outside hook-up, without having to go to a central auditorium.

The radio appears to stimulate certain types of activity. Some industries use it for the benefit of men at work, claiming that

¹⁰ John T. Shuman, "Helping Our Graduates Find Work," *Industrial Arts and Vocational Education*, October, 1933, pp. 283-5.

production is increased thereby. A well-known land-grant college turns on the radio in the dairy barns when the cows are being milked. It is claimed that the cows like it and give their milk more readily when listening to the music.

(4) *Teaching aids for the asking.* Smith and others have listed for our use many fine teaching aids that can be had free of charge or at a nominal price.¹¹ A study of current trade magazines and professional periodicals will give further sources for such material.

(5) *Movies sponsored by manufacturers.* A few years ago many commercial concerns had sets of slides that were sent to schools for instructional purposes, at the cost of transportation. The trend now appears to be in the direction of sending out films and film strips. Another development is the wider use on the part of business and industrial establishments of sound equipment. They have portable units which are largely employed with their own sales force and dealers. The schools can get similar service free. The advertising feature is usually reduced to a minimum just as it is in high-grade radio programs sponsored by business concerns.

(6) *Practical demonstrations.* When new processes, tools, materials, and machines are developed, it is customary for the manufacturing or sales agency to put on demonstrations for the benefit of those who may use them. Many fine practical demonstrations may be brought to the school shops without expense, or the shop classes may attend such demonstrations given elsewhere in the community—especially in the larger centers.

(7) *Traveling museums.* Occasionally traveling museums, such as that sent out by the Forest Products Laboratory, Madison, Wisconsin, or by the United States Department of Mines for safety instruction and rescue work, can be brought to the community. Some states use traveling libraries and traveling displays of value in motivating instruction.

(8) *Collections.* Collections of one kind or another that relate to school shop instruction serve as an impulse to learning with some. Examples of such collections are: (1) samples of woods,

¹¹ Homer J. Smith, *Teaching Aids for the Asking*, University of Minnesota Press, 1931.

leaves, bark, cones, or other parts of trees or shrubs; (2) samples of material, especially the newer materials employed today; (3) catalogs and reference material dealing with a given subject, such as period furniture, welding, the manufacture of products like steel, glass, stone, and clay products, foods, clothing, textiles, plastics, and the like. Data relating to the source and cost of materials used in home-crafts, hunting, fishing, kite-flying, model air-plane construction, etc., are stimulating to others.

22. **The instructor and the pupil.** In a very fundamental way motivation of instruction depends upon the teacher. It is his function to diagnose individual needs; to encourage where encouragement is needed; to restrain when restraint is in order; to instill hope where hope is on the wane; to reflect confidence in other situations; to use kindness and tact as occasions demand—in short, it is the teacher's job to so set the stage and so guide learners that they will develop within the limits set by inheritance and by their efforts.

But this is only half the picture. The whole burden of making instruction interesting and vital cannot be placed on the teacher alone. Teaching and learning are reciprocal, complementary, and inter-dependent functions. An instructor can motivate and teach effectively only when the pupil wants to learn, and when he will put forth sustained effort in that direction. One may transfer real estate by written assignment, but one cannot thus transfer knowledge, skill, understanding, and appreciation. They must be won through personal effort.

When motivation is integrated with efficient and sound teaching, and when the learner cooperates whole-heartedly, then we may look for real progress in learning.

PRACTICAL SUGGESTIONS FOR TEACHING

The following points, growing out of the material presented in the foregoing chapter, may be suggestive to teachers.

1. The sources for motivation should be sought with due regard to the age, sex, and personality traits of the individual.
2. In general, the most powerful drives for action are those that spring from race-old behavior traits. Individuals as well as groups

are influenced or swayed more easily through the emotions than through the intellect.

3. Instruction is made more interesting by emotionalizing it. Group instruction is usually more interesting than home-study because the teacher and the classmates introduce incentives through their presence, their words, and their actions.

4. Since home-work is more difficult than that done under teacher supervision, much care should be exercised in assigning home-work in order that the general effect will be satisfactory. Ordinarily the basic principles involved should be taught in school and the home-work should consist in doing work that will give greater mastery without involving new principles or methods.

5. In dealing with individuals, as well as with groups, give due consideration to the underlying motives that called forth the action under consideration.

6. When we question the motives of persons who do something commendable, we skate on thin ice.

FOR DISCUSSION

- 1 How may the curiosity of individuals be used to stimulate learning?
- 2 Explain how the teacher may effectively use the appeal to personal growth or development as an incentive to learning.
- 3 Cite a specific example that illustrates how the usefulness or usability of the subject matter can be employed as a stimulus to learning.
- 4 Discuss the motivating value, in your field of major interest, of: (a) school journeys; (b) visual and sensory aids, (c) collateral reading.
5. Illustrate the difference between motivation and entertainment.
- 6 Are interests innate or may they be acquired?
- 7 Discuss the motivating value of practical arts or vocational education for other areas of education.
8. What distinction may be made between a motive and an incentive?
9. Explain the place and function of motivation in learning of the manipulative type.
- 10 Show how you would motivate: (a) a drill lesson in your area of special interest; (b) an assignment.
11. Cite examples to show how age or maturity is taken into account in motivating instruction.
12. What is meant by "social pressure" and how can it be used for purposes of motivation?
13. What kinds of posters and charts are conducive to learning in your area of interest?
14. Explain fully how social-economic forces may be used as incentives.
15. What is meant by "material cultures" and how can they serve as an urge or drive to learning?

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CHAPTER VII

TEACHING PUPILS HOW TO STUDY

LEARNING IS MADE MORE EFFECTIVE THROUGH RIGHT PROCEDURES

1. The meaning of study. Various interpretations are made regarding the meaning of "study." To some pupils who have been drilled in rote memory work and factual repetition, the word, study, is practically synonymous with memorization. Others think that it is working according to prescribed rules, as in the fundamentals of arithmetic, and there are those who look upon it as any procedure through which good marks in school are obtained. Now all these elements may be involved to some extent, but study embraces more than these factors. The word, study, is best reserved for *purposeful effort involving careful thought and protracted attention to the acquisition of knowledge or skill*. Study is work as contrasted with play. It involves earnest and careful consideration of problems, facts, questions, or situations. Study is usually the intellectual response to a felt need, a difficulty that is to be overcome, or a problem that is confronted. The mental response may, and often does, include manipulative activity. Studying, in the broader connotation of the word, means *systematic effort to learn*.

An analysis of the study activities of many junior and senior high school pupils was made by 230 teachers, graduate students in education.¹ It verifies the popularly held belief that pupils undertake a considerable variety of activities when they study. These procedures were grouped under eight major heads, namely:

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| (1) Reading | (3) Memorizing |
| (2) Problem solving | (4) Note-taking |

¹ M. N. Woodring and C. W. Flemming, *Directing Study of High School Pupils*, New York, Teachers College, Columbia University, 1929, pp. 81-3. (Used by special permission of the publisher.)

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|------------------------------------|-------------------------------|
| (5) Following directions | (8) Manipulation of tools |
| (6) The use of books and materials | and materials of construction |
| (7) Reading of special devices | . |

Each of these forms of study will be discussed more fully later in this chapter. Our present purpose is to point out something of the range of activities included in study and to call attention, in passing, to the fact that manipulative work, such as is done in school shops and laboratories, is included in the list just given, as a *study* activity.

Study is a dynamic activity; for learning is an active, life-long, continuous process. Studying is, of course, by no means limited to classrooms and school shops and laboratories. Nor is it restricted to teacher-directed activities. The school is a place where study attitudes, study habits, and study techniques are taught in the hope and expectation that they will be continued in later life.

2. The value of effective methods of study. Study is a means of personal growth. Through it individuals learn valuable lessons that have become a part of the rich heritage of civilization. Through study dependence upon others is replaced by greater independence, and as one eventually sees life in its broader aspects—in its national and international bearings—study leads on to inter-dependence. Study is a form of self-help—a tool much used by self-made men like Abraham Lincoln and Thomas A. Edison. Study is valuable because it develops understanding, insight, self-reliance, and ability. It is a tool as well as a procedure and a mode of life that gives man greater control over his environment. It is at once a means of self-realization that makes maximum growth and development possible, and at the same time a means for group or social advancement.

No one appears to question the social and economic value of study. Why is it, then, that the science and art of effective study are not taught more generally? Perhaps it is because, to an appreciable extent, teachers and parents have had little training in diagnosing faulty methods and in the practical application of the psychology of learning. It is also likely that it has been

commonly assumed that, if one will make the effort to learn, satisfactory results will follow. There are fallacies in this assumption.

It is agreed, rather generally, that much time and much effort are wasted in secondary schools, in college, and in the world of work through ineffective and uneconomical study procedures. It would appear to be almost self-evident that time spent by teachers in guiding pupils in more efficient study habits would pay big dividends. Colleges still find it advisable to give in-coming freshmen instruction in how to study and how to use the library.

There is evidence to warrant the belief that there is too much contentment with mediocrity—too much of a tendency to seek pleasure rather than sustained mental effort—among pupils in secondary schools and students in college. A noted physician has remarked that “an area of great unemployment lies between the ears.” Pupils sometimes give one the impression that they are afraid to be different from the mass—that they would rather not be known as outstanding students. If that is true, it is most unfortunate, because the world greatly needs outstanding, capable, analytically minded men and women. When serious illness threatens, we want the best doctor that can be had; when a large corporation wishes to employ an engineering college graduate, it asks for the best man available, and, when a school board seeks a prospective teacher, it too asks for the best individual in the graduating class. Correct study procedures, right goals, and socially oriented attitudes make achievement in such, and in other vocational pursuits, possible.

The many fine public and private schools for which America is favorably known, her extensive program of free public education, and the large sums spent in support of schools all indicate that we, as a people, value education. Happier living, greater opportunities for service, social approval, position, and honor lie within the reach of many who will never attain them to a marked degree because they were not taught how to study and were not inspired to develop right study habits that would have made these things possible.

Knowledge may be forgotten with the years but the self-discipline, the power, and the insight that come from years of

faithful, rightly pursued study can be counted among those things that will remain a priceless possession.

3. The psychology of studying. Since the process of studying is essentially earnest, thoughtful, and sustained learning, one may rightfully infer that the psychology of study and the psychology of learning are closely inter-related. The basic laws of learning appear to be so simple that at first thought it might seem unnecessary to mention them here. Upon closer analysis, however, one will see how fundamental they are to a correct concept of study. It will be our purpose to discuss the more important laws of learning in relation to study.³

(1) *Readiness to learn.* According to the so-called "law of readiness," it is satisfying for an individual to learn when he is ready to do so, and annoying for him to learn when he is not ready. According to this, effective study is most likely to result when the individual desires to learn. From this standpoint proper assignments and suitable motivation of the lesson, project, or unit of learning to be mastered are distinctly necessary. New response preferences or "readinesses" can be built up which will further economical learning.

The term "mind-set" is used when the neural readiness is of a prolonged nature and when it is motivated by some desired goal or objective. Will-power and determination, which are words more commonly used by laymen than mind-set, convey about the same meaning. It is rather generally believed that mind-set or mental-set has a very direct and strong effect upon effort and zeal in learning. Mental work is best done when there is a sustained study-set—a continuing readiness and determination to master whatever is undertaken.

(2) *Exercise, or use and disuse.* Other factors being equal, exercise strengthens neurone connections and thus improves learning, or makes it more permanent, so that it will not be forgotten as readily as it otherwise would be. And lack of exercise—which means lack of making such neurone connections—tends to overcome the effects of learning. These illustrations are but approximate explanations. Learning is very complex, and hence it

³F. Theodore Struck, *Methods and Teaching Problems in Industrial Education*, New York, John Wiley & Sons, 1929, Chapter III, "How We Learn."

cannot be explained quite as simply as one might at first suppose possible. To study means more than to add additional units to one's stock of knowledge—like adding books to those already on the shelf. Learning has been compared to a chemical process in which every particle added transfuses and modifies the whole.

The law of exercise, or of use and disuse, as it is sometimes called, holds that under proper conditions learning is improved through practice. This concept is involved in the popular slogan: "Practice makes perfect."

The amount of over-learning, repetition, or drill that is required to overcome forgetting effectively varies according to the nature of what is being learned. Learning that "gets into the muscles"—which involves muscular as well as mental effort—is likely to be more permanent than that which involves only mental effort. Manipulative skills, such as those developed in the practical arts, are retained much more easily than factual knowledge. Study that is supplemented by visual and sensory aids is more effective, certainly, than abstract learning.

(3) *Effect*. While, in general, exercise strengthens neurone connections, this is not always the case. Much depends upon the effect or outcome of the action taken. An inexperienced driver may push down hard on the brake-pedal when traveling on a slippery road, if confronted with a road obstruction some distance ahead, but he will not do it often because the effect may be disastrous. One may have a desire to feel "dry ice" to see how cold it is, but one will probably not repeat the experiment.

The general principle that desired traits or forms of behavior should be strengthened by associating satisfaction with them, and that undesirable responses or forms of behavior should be discouraged by associating them with some appropriate form of annoyance, is very suggestive as a means of furthering good study habits and of discouraging those that are harmful or ineffective.

4. *Self-confidence and initiative*. Familiarity with the best thought that is available on any given subject is a desirable starting point for creative thinking and practical action. True learning combines humility and self-assurance in ways that are socially effective. Earnest study that is kept up year after year,

and which is put into practice, will normally help to develop a desirable amount of self-confidence and initiative. Study that does not lead to improvement of understanding, to finer appreciation, to greater enjoyment, or to better practice is useless. The effectiveness of study is sometimes impaired seriously by brooding over matters that are beyond one's control; by permitting oneself to imagine that there is unfair discrimination; or by developing an inferiority complex. Emotional disturbances of such and of other kinds may be reduced to a minimum through constructive teaching that will help to inspire attentive, reflective, and analytical study. Self-confidence is usually developed gradually by adapting the load to the individual's capacity, and by enabling him to feel the satisfactions that should come as a reward for extended effort.

5. **Placing the emphasis where it belongs.** As an incentive to study it is suggested that the device be followed of placing the responsibility for learning where it belongs—namely on the learner. If learning is "thinking into one's own understanding a new idea or truth, or working into habit a new art or skill,"² then learning must be an individual matter and the emphasis should be put upon *pupil* activity. This is naturally something that should be done bit-by-bit, under wise teacher guidance, the objective being to develop increasingly the learner's capacity to take responsibility for learning. The general principle is recognized to some extent when instruction sheets, blue-prints, or plans are so arranged that successive ones give increasingly fewer directions and explanations and call for correspondingly more thought, resourcefulness, and effort on the part of the pupil.

In order to motivate study the teacher may find it advisable to suggest sources of information and to aid the pupil in organizing his learning in suitable units around specific goals that are attainable, and appeal to the individual as being worth while.

6. **Thinking is essential to study.** In the simpler or lower forms of learning, thinking forms but a minor part. Children learn to spell, to speak their native tongue, and to master the multiplication tables with a relative minimum of careful thinking. On the other hand, as the problems to be solved, or the situations

² J. M. Gregory, *The Seven Laws of Learning*, p. 5.

pupils to evaluate what they study the thought processes are brought into use. When the learner is constantly on the alert in the effort to determine whether or not statements or facts as presented by another should be accepted or questioned, study takes on a deeper meaning than it would otherwise.

McMurry has called attention to the desirability of approaching the study of books with an open, sympathetic mind.⁴ He believes it to be desirable to try to see things through the author's eyes and from his point of view. When so seen, a critical analysis is likely to be fair and constructively helpful. Much truth is of ancient origin; many noble thoughts were penned generations ago. Sometimes recent research throws added light on previous knowledge which to a greater or less extent disproves older concepts. It is the extreme radical, quite uninformed about the contributions of the past, who thinks that nothing is right except that which is being thought or done for the first time. It would be more fair to concede that the best thought of the past may have equal value with the new and the untried toward improving life.

Deliberate thinking as a part of attentive study will cause us to be on the look-out for truth. It will help us to distinguish between propaganda that is inspired for ulterior purposes and knowledge that is based on known facts or which has the sanction of reflective thinking. Evaluating or judging is life-like and essential to progress. It is one of the important steps in learning by the project method as set forth many years ago by one of America's great educators.⁵ The steps are: (1) purposing, (2) planning, (3) executing, and (4) evaluating or judging.

In evaluating work in the practical arts questions such as the following ones should be considered:

8. **Causes of ineffective learning.** We sometimes learn best through contrast. Just as abnormal psychology contributes to the understanding of normal human behavior by enabling us to contrast and compare extremes, and as pathology contributes to medicine, so knowledge of causes of uneconomical learning should add to our understanding of how to encourage efficient learning. With this in mind, some common faults in study habits and techniques will now be presented.

(1) *Lack of definite, worth-while goals.* There is a distinct difference, which has not always been observed, between goals that pupils hold to be worth while and those that teachers and other adults value. In order that study may be zestful, considerable thought should be given, by the teacher, to working out, with pupils, goals or objectives which the pupils are ready to pursue with vigor.

Few things are more destructive to pupil interest than hazy, indefinite objectives. Each lesson assignment should be clearly understood if earnest, concentrated, and effective study is anticipated.

(2) *Accepting statements uncritically.* There is abundant evidence that the practice of accepting statements in textbooks and reference books without subjecting them to thoughtful scrutiny is entirely too common. And what has been said of printed matter is also true of the spoken word. The individual who believes everything that he reads is in a worse predicament than the one who cannot read. Pupils should be taught to think for themselves, and a good way to teach it is through stressing the value of reflective study.

(3) *Superficial habits of observation.* Individuals differ greatly in the accuracy with which they observe. Other factors being equal, one observes most closely in areas of special interest. Thus a blacksmith notices rather carefully the conditions of horses' feet; the barber, the way one's hair is cut; and the painter, the condition of the paint on walls and buildings. Beginners in industrial arts and vocational education, whose attentions have not been called to the fine points of workmanship, are likely to overlook details that are essential to good work. Pupils, in the

main, must be *taught* to observe with accuracy. The refinements in design and construction that differentiate superior from average projects must be brought to their attention. Beginners lack suitable standards of quality until they are taught them.

As Hollingworth has said, "*discovery must precede learning.*"⁴ Before improvement in knowledge or skill can take place the pupil must have a mental image of what is to be done. Before he can learn how to do a given job, he must observe rather carefully the nature of the work that is to be performed. It is suggested that frequent checking, to determine the degree of accuracy with which pupils have observed demonstrations or other things, should be undertaken by the instructor.

(4) *Difficulty in determining relative values.* In this fast-moving, high-pressure era when events of far-reaching momentous importance confront the world in endless succession, it is not to be wondered at that young as well as older persons have difficulty in determining the true from the false, the passing from the enduring, the gold from that which merely glitters. Study, which in itself may have no special appeal to youth, but which appears to have significant value for pupils in the eyes of the teachers, can probably be presented in ways that will cause the learners to see it in its true life relationships.

Thought-provoking questions, pointed discussion by members of the class, and the practice of trying to see problems and situations in the longer view and from various angles are suggested as methods of approach that will help to overcome the difficulty that is universal—that of deciding what to pursue and what to reject in knowledge, activities, and human relationships.

In view of the extent of knowledge—so vast that no man can hope to master it all—selection must be made. And with the younger pupils, particularly, the selection must rest largely with experienced teachers in so far as school work is concerned. Good, effective teaching does not consist in spraying pupils with ideas—it is not based upon the practice of enveloping their minds with clouds of vague generalities that befog their intellectual

⁴ Hollingworth, *Educational Psychology*, New York, D. Appleton-Century Co., 1933, pp 27-30

perception, as the progressive orchardist surrounds with toxic mist his precious fruit trees threatened with codling moth.

9. **Effective study procedures.** It is possible to develop good study habits just as it is feasible to build good habits of craftsmanship, of social behavior, or of recreation. By a habit is meant an acquired or *learned* tendency to respond to given situations in the same way again and again. Habits of thoughtful consideration, of asking oneself the "how," "why," and "when" of things, can be built up by repeated effort. In other words, individuals can develop the habit of being studious, and it is possible to have an inquiring, learning attitude toward one's environment no matter how much the environment may change. The individual who develops the learning habit will be observing and will do reflective and creative thinking in appropriate situations. He is likely, therefore, to be more successful in whatever he undertakes than others who have not developed this socially valuable ability. Among procedures that are helpful toward developing effective study habits, the following are suggestive (captions are put in the form of direct suggestions):

(1) *Conserve your health.* Learn to balance study, physical activity, recreation, and sleep. Fatigue, which is a physiological condition arising when more waste products or toxins are formed than the body can, at the time, eliminate, is detrimental to effective learning. In such a state toxins—lactic acid and acid potassium phosphate—are formed.⁷ Among the mental symptoms are: reduced powers of attention, of comprehension, and of recall. There is an increased tendency toward irritability and greater stimulation is required for mental response. Useless worry, lack of sufficient sleep, excessive nervous excitement, inadequate exercise, poor ventilation, and faulty posture may all contribute to conditions of fatigue.

(2) *Have a definite study schedule.* Learn to budget your time. Determine the amount of time that is to be spent in your various activities. If you need more than eight hours of sleep per day, plan for it. You will work at your greatest efficiency if

⁷ Paul Klapper, *Contemporary Education*, D. Appleton-Century Co., 1929, pp 45-51.

you get adequate sleep. Decide upon what hours each day shall be spent in study and stick to your schedule.

(3) *Do your most difficult studying when you are in the best condition.* If possible do your hard work first, and play afterwards. It is a mistake to postpone difficult mental work until the late evening when physical strength and mental alertness are at a low ebb. Better work can be done in the middle of the afternoon than immediately after the noon meal. If necessary, good learning can be done when there is physical fatigue, by exerting sufficient will-power. But eventually nature's laws will have their way.⁸

(4) *Employ visual and sensory aids.* Other factors being equal, learning is most effective when all possible sense organs are employed. Thus outlining reports or studies helps one to remember facts. Manipulative activities associated with mental effort aid in learning. Speaking helps to fix words in one's memory. The senses of sight, of hearing, of smell, and of touch all aid learning, and they can be developed to high degrees of usefulness if so desired.

(5) *Learn to concentrate.* It is possible to develop the habit of working earnestly, quickly, and efficiently. It is claimed that few individuals approach their maximum efficiency in study. Learn to study as purposefully and as energetically as you play. Acquire the ability to shut out confusing noises that tend to interfere with the flow of your thoughts. The ability to do this is distinctly advantageous, for in many occupational pursuits it is very necessary to do this.

(6) *Create a study environment.* It is desirable to have a place—in your home at least—that means *study* to you. Let it breathe study and inspire you to learning. Pictures that cause you to “day-dream,” books that distract, recreational equipment that lures you away from your place of work have a tendency to interfere with systematic study. One can overcome such “obstacles,” if need be, but it may make it easier, for some at least, if the

⁸ Guy M. Whipple, *How To Study Effectively*. Bloomington, Ill., The Public School Publishing Company, 1916 (A concise presentation of thirty-six rules suggested to improve effectiveness of learning.)

study environment is more conducive to sustained learning and less to leisure or play. External aids, such as a dictionary, reference books, handbooks, a drawing board and instruments, and a typewriter are helpful. But avoid piling on your study table so large an array of reading material that you cannot possibly go through it. That may eventually cause worry and reduce mental efficiency.

(7) *Look for the hearts of problems.* It is good practice to seek for reasons, causes, procedures, and results. Get the vital facts. *Learn to get the gist of things. Distinguish between the meat and the gravy.* The following devices are used for such purposes:

- a. Underscore vital words or phrases in reading material (provided the material is your own). If this practice is followed it should be done neatly.
- b. Check or mark in some other way the most important parts of what is read. Some employ parallel lines at the side, others use brackets or parentheses.
- c. Make marginal notes, using key words; list references or make brief comments for future reference if the material is your own and you do not object to so marking the pages.

It is usually contrary to the regulations to so mark books or periodicals belonging to the public.

(8) *Learn to organize the essential ideas.* In listening to a presentation or a discussion try to fix in your mind the important parts or central points or topics that form the frame-work of what is covered. In studying books or periodicals it is often helpful to make an outline in as great, or as little, detail as may be necessary. The following types of outlines are commonly used:

- a. A numbered list of brief conclusions or summary statements.
- b. Main topics, supplementary points, and sub-points arranged according to the Harvard or some other system of notation.

The following sequence of symbols is commonly employed:

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 A
 1.
 a.
 (1)
 (a)

c. Outlines employing parallel columns for comparison, as for example:

Item to be compared	Column I Vocational Education	Column II Practical Arts Education
1. Purpose	To prepare for occupation	Exploration, try-out, guidance
2. Age of pupils	Sixteen years or older	Most typical age 12 to 16 years
3. Equipment, etc	According to trade or occupational demands	Usually lighter to suit age and capacity of pupils

The purpose in this plan is to place contrasting items side-by-side in order that they may be compared easily.

d. Outline employing brackets to denote relationships as is illustrated herewith:

Superintendent of schools	1. Principal, senior high school	Custodians { Pupils in full-time classes Teachers { Pupils in evening classes Librarian { Pupils in part-time classes
	2. Principal, junior high school	
	3. Supervisors of special activities	

(9) *Learn to control your moods.* Moods may either energize or they may enervate; they exhilarate or depress; they help or they hinder study. There is reason to believe that a certain amount of emotionalization is helpful to learning in that it adds human interest and zest and is thus conducive to greater effort. But strong moods interfere with logical reasoning, impersonal evaluation, and sound appreciation.

Moodiness may result from such factors as worry, fatigue, wrong mind-set, malnutrition, and poor physical condition. A distinction should be made between moodiness which is slight, fleeting, and relatively rare, or an abnormal phenomenon in an individual, and moodiness that has become habitual.

(10) *Apply what you learn.* Some people wonder how it is that others can readily recall apt stories or famous sayings, or how they manage to use such descriptive or picturesque speech. The answer is: They practice what they learn. Whipple has well said that among the most important of the rules governing effective study is the one which bids us, in all our study efforts, to "apply your knowledge as much and as soon as possible."⁹

⁹ *Ibid.*, p. 32.

Closely related to this is the principle of following wrong practice as quickly as possible with correct procedure. When an acrobat fails in his stunt, he usually tries again until he succeeds. Then the feeling of success helps to counteract the feeling



FIG. 16. Future automobile mechanics at work in this fascinating well-equipped shop in the Automotive High School, Cincinnati, Ohio.

of failure. If a boy in the shop employs the wrong technique with a tool or machine, his error should be followed at once, or as soon as possible, with practice that is right, which should receive suitable commendation from the teacher.

10. Study through manipulative activities. Economical learning according to Muse, "demands that the learnings get into the muscles. Muscular expression of some nature should be a phase of each study period."¹⁰ There appears to be rather general agreement that theory and practice should go hand-in-hand, and that much may be learned through participation or actual experi-

¹⁰ Maude B. Muse, *Efficient Study Habits*, p. 54.

ence. Shop teachers know that the practical manipulative work done by pupils stimulates their thinking, sharpens their powers of observation, refines their judgment, and deepens their appreciations.

Manipulative work is a means or vehicle for purposeful mental and motor effort. For many it is the ideal way of learning within the range in which it is possible to use it.

In acquiring habits of manipulative skill the following points are suggested:

(1) *Get a clear idea of what is to be done.* Observe carefully each successive step in the process and know what outcome is sought—get a clear mental picture of the job as a whole and of each step in it. For teaching purposes each step in the process must be short enough to be clearly remembered.

(2) *Associate the underlying principles with the acts that are performed.* Know *why* as well as *how* each act is performed as it is. To illustrate, on certain cuts in woodwork the chisel is held with the flat side next to the object; at other times the beveled edge is used instead. The pupil should know the underlying reasons so that he will be independent of rules.

(3) *Demonstrate correct practice.* Demonstrate right practice and do not permit variations to occur unless there are two or more ways that are of approximately equal worth. In the latter event the instructor should determine whether it is likely to be helpful, or whether it would only confuse the learner, if both methods were taught simultaneously. To illustrate, most teachers of mechanical drawing believe it to be unwise to attempt to teach vertical lettering and inclined lettering at about the same time. They believe that it is better to develop a reasonable mastery in one style before the other is undertaken.

(4) *Improve your technique.* In work involving a high degree of personal skill of execution—as is true of the skilled crafts and the arts—habit formation should be such that increased mastery will be the outcome. Successive periods of practice should be evident in greater refinement, dexterity, and mastery of the processes involved. The general statement, made in a preceding paragraph, that variations should not occur in teaching skills, is not to be interpreted too narrowly.

(5) *Improve current practice.* As one masters manipulative skills, reflective thinking and experimentation may lead to improvements not only of minor practices but also possibly of basic procedures. Habits are but means to ends and man must not become a slave to habits. Progressive shop practice will always look toward unrealized goals and will strive for better ways of doing what is socially and economically worth undertaking. Material improvements which have come with such startling rapidity during recent decades are evidences of man's struggle to control nature through the applications of knowledge and skill.

Improvement is often made by using more objective measurements, by inviting suggestions and constructive criticism of one's work, and by observing others at work. Competitions and exhibits have proved valuable as a means of stimulating individuals to greater effort and to higher achievement.

11. *Reading habits in relation to study.* In their study of reading interests and habits of adults, Gray and Munroe have shown that the amount of reading material that is being published has increased far faster, proportionally, than has the population of the United States.¹¹ Newspapers and magazines, they find, have increased in number far more rapidly than have books, and adults read short, unrelated types of material more extensively than books. Reading is done by adults for a variety of purposes, which include: vocational objectives, relaxation, emotional satisfaction, culture, the satisfaction of curiosity. The study indicates that a surprisingly large number of cheap, sensational types of magazines are widely read, and the authors feel that definite guidance in reading is needed. A hopeful sign is seen in the fact that young people today select their reading material in a wider range than formerly.

Reading, which Hollingworth has defined as "certain ways of reacting to the stimulus of printed or written language,"¹² is a most important source of education. Other factors being equal, it is believed that those who read much—provided what they read is well selected—have broader interests, deeper appreciations,

¹¹ William S. Gray and Ruth Munroe, *The Reading Interests and Habits of Adults*, New York, The Macmillan Co., 1929, pp. 259-74.

¹² H. L. Hollingworth, *Educational Psychology*, New York, D. Appleton-Century Co., 1933, p. 320.

and a wider outlook than those who read little. One must not, however, think of wide reading essentially as a school activity. For example, the beautiful English that Lincoln used was probably largely acquired through thoughtful home-reading. Reading can be improved, and as it becomes more effective, one's ability to study through means of the graphic arts is directly enhanced.

Procedures such as the following tend to improve the efficiency of reading:

- (1) Read widely and do much reading, but in general avoid excessive fatigue, as this tends to encourage bad reading habits.
- (2) Stress speed. Practice reading at a faster pace. Time yourself and see if you can improve your record. Comprehension does not necessarily suffer as a result of increased speed.
- (3) Discriminate between the key phrases and less important parts of the material read. As you read raise questions concerning "how," "why," "where," and "when" and summarize the material as you read it.
- (4) Use supplementary aids such as the dictionary, handbooks, and standard reference works in order to increase your vocabulary and your range of knowledge.
- (5) For extensive reading, stress silent rather than oral reading; if committing to memory, employ oral reading when circumstances permit.

12. Studying the "related subjects." From the standpoint of home-study, mathematics and science present certain difficulties not met in some other areas of learning. Jones and his associates believe that the chief difficulties met in mathematics can be traced to: (1) The pupils do not take time enough to manipulate the mathematical symbols. (2) Emotional attitudes contribute to failure. (3) Pupils have poor background or preparation.²³ They believe that if a pupil has serious difficulty with mathematics it is best to secure a tutor, because, when studying alone, one may be led into wrong impressions which may persist for a long time. In tutoring a pupil in mathematics, much time should be spent in questioning the pupil rather than in working out the problems for him.

Practical problems in mathematics involve at least two diffi-

²³ Edward Jones, *Improvement of Study Habits*, Buffalo, N. Y., Kenworthy Printing Co., Inc., 1931, pp. 81-91.

culties. The first has to do with translating the problem into suitable symbolic mathematical form, whereas the second is due to wrong reasoning caused largely by faulty technique. Jones contends that the step that is most frequently slighted, and which is necessary to a successful mastery of mathematics, is testing and validating the formulas or principles employed.

Drawing, both mechanical and free-hand, can be pursued more effectively through individual study than can mathematics, because of the difference in the nature of the work. In drawing *technique* is important. This is developed through extensive practice which is directed toward standards that are fairly clear.

The ability to sketch is of great value to individuals who expect to follow vocations in which design and construction are involved. A free-hand sketch is to a designer or a craftsman what short-hand is to the stenographer. Through it one can represent pictorially or graphically what would be quite impossible to express in words. Drawing knows no boundaries of race, color, or political sub-division—it is a universal language.

13. How to take notes. Teachers may help pupils more than is often realized by teaching them how to take notes in efficient ways. The methods that are employed should be adapted to the conditions that are met, and should be modified according to the purpose that they are to serve.

Notes should be neither too wordy nor too brief. In general they should represent in concise form the *key* thoughts, the *important* facts, the *salient* directions, and the *basic* conclusions. Notes, in the main, should not be word-for-word reports but brief summaries in your own words. Use occasional quoted expressions if they have special appeal or value. Become familiar with the standard conventions that are used in drafting and develop the habit of using small sketches to supplement notes. The practice thus secured leads to better performance, and there are many opportunities to employ such skill in the practical arts. In mathematics and science it is helpful to know and use the standard symbols such as $>$, $<$, and \therefore . In fact such symbols may be used in taking notes quite unrelated to mathematics. Many symbols are employed in such areas of industrial educa-

ten main classes, showing the range in the three integers which compose that part of the index number which is found to the left of the decimal point, is shown herewith. (The remainder of the classification number is in the form of tens and hundreds to the right of the decimal point.)

000	Bibliography, library economy, book arts
100	Philosophy, psychology, ethics
200	Religion
300	Sociology, education
400	Philology, grammar
500	Pure science
600	Applied science, medicine
700	Fine arts, music
800	Literature
900	History, description, and travel

The Library of Congress System is also used by some libraries. In this system the divisions are indicated by letters of the alphabet followed by Arabic numerals.

What the alphabetical index is to a book, the card index is to the library. Library books are arranged in the card index by author, subject, and title so that the publication can be found under at least one of these headings, and probably under all three. The cards are also cross-referenced so that a book dealing with industrial arts and vocational industrial education may be listed under two or more subject headings.

For reference purposes indexes, encyclopedias, dictionaries, and yearbooks of various kinds are frequently exceedingly useful. The list which follows is by no means complete, but it will suffice to indicate some of the more important sources of knowledge available in libraries.

1. *Indexes.* Indexes are used to find articles on various topics which have been published in either book or periodical form. The following ones are among those most commonly found in libraries.
 1. *Agricultural Index.* (1916 to date.) This index covers periodicals and journals in the various phases of agriculture, rural education, and agricultural education.
 2. *Art Index.* (1929 to date.) This index covers the broad area of the fine arts as given in 149 art and museum publications.
 3. *Cumulative Book Index.* (1928 to date.) This is a continuation of the *United States Catalog*.

4. *Educational Index*. (1929 to date.) This index is a continuation of the Loyola Index of 1928, which was discontinued. It includes references to *Industrial Arts* and *Vocational Education* and *Industrial Education Magazine*. This index is especially useful to all students of education.
5. *Engineering Index*. (1884 to date) An index to engineering and related technical subject matter reported in journals, bulletins, and books.
6. *Industrial Arts Index*. (1914 to date) This index covers business, finance, science and technical periodicals but does not cover *Industrial Arts* and *Vocational Education* and *Industrial Education Magazine*.
7. *International Index*. (1907 to date) It covers journals in the field of pure science and the liberal arts, both American and foreign.
8. *Poole's Index to Periodical Literature*. (1802-1881.) The supplements continued to 1906. Now covered in the *Readers' Guide to Periodical Literature*.
9. *Psychological Index*. (1894 to date.) Covers periodicals and books dealing with psychology, in all languages. Includes references to industrial and personnel problems
10. *Readers' Guide to Periodical Literature*. (1900 to date.) Information on articles appearing in the more general magazines. It replaces *Poole's Index*.
11. *Readers' Guide Supplement* (1907-1919) This was the beginning of the *International Index*.
- II. *Encyclopedias*. Among the encyclopedias that are helpful to pupils as well as teachers are the following ones:
 1. *Encyclopaedia Americana*
 2. *Encyclopaedia Britannica*
 3. *Columbia Encyclopedia*
 4. *Encyclopaedia of the Social Sciences*
 5. *Hastings Encyclopedia of Religion and Ethics*
 6. *Monroe's Encyclopedia of Education*
- III. *Dictionaries and Other Reference Works*
 1. *Dictionary of American Biography*
 2. *Dictionary of American English*
 3. *Document Catalog* (United States Government Publications.)
 4. *Funk and Wagnalls New Standard Dictionary*
 5. *Murray's New English Dictionary on Historical Principles*
 6. *New Larned History for Ready Reference, Reading and Research*
 7. *Patterson's American Educational Directory*
 8. *Putnam's Dictionary of Dates*
 9. *Statesman's Year Book*
 10. *Stevenson's Home Book of Verse*
 11. *Stevenson's Home Book of Quotations*
 12. *Sturgis, Dictionary of Architecture and Building*
 13. *Thomas' Register of American Manufacturers*

14. United States Bureau of the Census. *Census of the United States*
15. Warner Library of the World's Best Literature
16. Webster's New International Dictionary of the English Language
17. Who's Who (Living British)
18. Who's Who in America (Living Americans)
19. World Almanac

For further information concerning reference books, see Mudge, Isadore Gilbert, *Guide to Reference Books*, Chicago, American Library, 1936.

PRACTICAL SUGGESTIONS FOR TEACHING

As an outgrowth of the foregoing presentation the following view-points may prove of interest because of their bearing upon educational practice.

1. There appears to be general agreement that it is definitely worth while to teach pupils how to study effectively, and that this service should be rendered at the earliest age feasible. It is certainly not too soon to give fairly thorough instruction of this sort to pupils of junior high school age, and helpful suggestions can be made to pupils younger than that.

2. Suggestions concerning what to study should be correlated with how to study. In this way the suggestions can be adapted to the nature of the assignment.

3. Systematic study habits are developed through effort. Most children—as well as many adults—would rather play than study most of the time if they were given their choice. Consequently time spent in motivating study assignments is time well spent.

4. The suggestions made in this chapter should be adapted to individual differences. Everyone must find out for himself when and how he can study to best advantage. Some find early morning hours better for study than the evening hours. Others prefer the evening.

5. Pupils need frequent encouragement in studying. The alert teacher will give suitable recognition to meritorious effort and will try various devices to encourage those whose performance is not satisfactory.

6. Sketching, graphic representation, and good note-taking definitely help pupils to remember. Visual aids and sensory participation help to overcome forgetting.

FOR DISCUSSION

1. Explain how attitudes and interests affect study.
2. Mention several home conditions that are unfavorable to study and suggest how they may be overcome.
3. What could be done to improve the study conditions in your school?
4. How can pupils be trained to depend less upon the sheer memorization of subject matter?
5. What relationship is there between associates and study?
6. Why does expression aid in study?
7. Show how questions can be used effectively to motivate study.
8. Distinguish between the problems or difficulties of home-study and of teacher-supervised study.
9. What values are there in reading good literature extensively?
10. What is the probable effect of applying study problems to life situations?
11. How may one develop confidence in his ability to remember?
12. Discuss the value of mnemonic devices as memory aids.
13. What are the chief advantages of measuring progress in learning?
14. What are the advantages of knowing the author of the articles or books you read?
15. Explain how friendly competition may stimulate interest in study.
16. How do sketching and drawing contribute to discovery and invention?
17. Discuss the inspirational value, to study, of a motion picture like the one depicting the life of Disraeli, Pasteur, or Rembrandt.
18. Cite one or more cases illustrating how home-study resulted in growth and greater opportunity for service.
19. What relationship is there between participation or doing and appreciation?
20. How can the thought-content side of shopwork be emphasized to advantage?

FOR SUPPLEMENTAL READING

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CHAPTER VIII

LESSON-PLANNING

PRE-PLANNING RESULTS IN BETTER TEACHING

1. **Types of educational planning.** Effective teaching calls for at least three types of planning. The first of these concerns matters that should be considered before the year's work begins—matters other than the course of study but related to it. Examples of this kind of planning are the thought that must be given to providing proper teaching facilities, to tools, materials of instruction, and supplies.

The second type of planning concerns the course of study. This is a very important type of planning, but one which will not be discussed at length here because it deserves separate, extensive treatment. It is mentioned at this time in order to bring out the inter-relationships between the several types of planning.

The third type has to do with the daily work of teaching—with lesson-planning. It is with this latter type of planning that this chapter is primarily concerned.

2. **Is lesson-planning worth while?** In general, most teachers as well as administrators will concede that *some form* of lesson-planning is essential to effective teaching. Just as there is urgent need for planning for social security, for economic stability, and for business expansion; just as the home-owner asks for detailed plans, specifications, and estimates of cost before proceeding to build his home; so, in like manner, educational work needs to be planned before it is carried into practice. One may compare the blue-prints and specifications furnished by the architect or builder to the teacher's course of study; and the day-to-day planning that the contractor and his men engage in, to lesson-planning. Just as the contractor sometimes burns the "midnight oil" in order that the work of the following day may move along smoothly and with dispatch, so teachers find it advisable to

plan ahead from day to day and week to week; just as the craftsman on the job must modify his plans to suit the nature of the materials and the working conditions as they develop, so likewise must the teacher adapt and modify his plans so that individual differences in pupils and the varying conditions of work may be used to best educational advantage.

It must not be overlooked, however, that here and there teachers are being asked for lesson-plans that take more of the teacher's time and energy than such plans are worth. The trouble is not that lesson-planning is wrong but rather that the teachers are asked to put on paper in attractive form too much data in view of their heavy teaching-loads. There are classroom teachers (many industrial arts teachers handle both classroom and shop-work) who teach as many as five different subjects a day. If they are required to submit a long, formal lesson-plan in each subject each day, there is no opportunity for them to get the recreation and rest without which they cannot long give efficient service. Furthermore, the conditions under which industrial arts and vocational industrial teachers work in their shop make it imperative that their lesson-plans be different from those that might fit academic instruction.

An extensive study of lesson-planning by Mossman⁴ indicates that the majority of teachers believe in lesson-planning—but not in the formal, traditional type that many of them were taught to use in their training courses in college. In this study only 1.5 per cent of 1103 teachers say they would not plan if they were not required to do so. Miss Mossman found that there was a difference in the lesson-plans in use when her study was made and what teachers would use if they were free to do as they wish. This is interpreted by her as a desire to use their time to better advantage. Whereas approximately one-fourth of the teachers had been taught to list items to be covered in their plans, twice that proportion were using this method as teachers. Pivotal questions were also used more frequently by teachers in service than when they were taught to plan their lessons. Her study reveals

⁴Lois C. Mossman, *Changing Conceptions Relative to the Planning of Lessons*, New York, Columbia University, Teachers College Contribution to Education, 147, 1924.

that the trend in lesson-planning is away from using the "five formal steps" of Herbartian origin.

In comparing older with more recently formulated definitions it is likewise possible to note a shift in emphasis. Thus one writer, in 1927, wrote: "Lesson Plan is the name of a statement of the things a teacher proposes to do during the period he spends with his class," whereas the following more recent definition by Bossing puts the emphasis on pupil effort rather than on teacher activity: "Lesson-Plan is the title given to a statement of the achievements to be realized and the specific means by which these are to be attained, as a result of the activities engaged in during the period the class spends with the teacher."²

Among the reasons that are commonly advanced in favor of lesson-planning are such as these listed in Table V.

TABLE V

REASONS COMMONLY ADVANCED IN FAVOR OF LESSON-PLANS

- (1) Lesson-plans help to clarify objectives.
- (2) Other factors being equal, they lead to better methods of teaching.
- (3) Spontaneous planning, done on the spur of the moment, is usually less satisfactory than planning based on reflective thinking.
- (4) Many difficulties may be avoided by anticipating them and by planning that will avoid or minimize them.
- (5) Lesson-planning gives confidence to inexperienced teachers and develops in them ability to plan instruction effectively.
- (6) It provides a plan for selecting and organizing procedures, activities, and content material.
- (7) It provides for definite assignments, availability of materials, and checking outcomes.
- (8) Lesson-planning provides for suitable transition from previous experiences to contemplated ones.
- (9) The lesson-plan serves as an incentive to the teacher to make adequate preparation for instruction.
- (10) It enables the teacher to plan for individual differences and special situations that need to be met.

3. The need for philosophy in lesson-planning. In discussing the functions of lesson-plans for prospective teachers, Colvin holds it important that student-teachers should think about their *teaching in relation to the scheme and function of education as a*

²Nelson L. Bossing, *Progressive Methods of Teaching in Secondary Schools*, Boston, Houghton Mifflin Co., 1935, p. 204.

whole.³ If philosophy of education were merely something that had little practical value, then there would be no place for it in practical teaching. But, since one's philosophy of life and of education directly affects attitudes, ideals, beliefs, and outlooks, it would seem to be very essential to progressive teaching. Colvin has wisely shown that *broad objectives must be combined with detailed purposes*; that narrow aims without larger goals are blind; and that general goals that are not translated into specific ends lead to hopeless idealism that will not function effectively—"there must be a hierarchy of ends, from the most general to the most detailed, if a lesson plan is to be adequately constructed." The principle involved can be illustrated by citing the case of the teacher whose lesson-plan calls for developing certain specific skill, knowledge, and appreciation, all of which are parts of the larger goal of training for effective living. The inexperienced teacher who desires to plan for a brief class demonstration, the purpose of which is to teach beginners some of the essentials about sawing and saws as used in woodworking, may have such points as the following ones for his lesson-plan:

- | | |
|-------------------------------|----------------------|
| (1) The cross-cut hand saw | (5) How to use saws |
| (2) The rip saw | a. Position |
| (3) Shape and size of teeth | b. Starting |
| (4) How to take care of a saw | c. Finishing the cut |

Other saws might likewise be discussed in this demonstration—such as the back-saw, coping saw, key-hole saw, and turning saw. Or more information could be given with regard to cross-cut and rip saws, but it would probably be better to reserve this discussion for another time.

4. **Suggestions concerning aims.** Every lesson that is planned should be thought through by the teacher in terms of the specific aims or purposes that are to control, to a greater or less extent, the means and methods that will be employed. In this connection the following suggestions may be of help to prospective and beginning teachers:

- (1) *Distinguish between aims and methods.* If your lesson-

³Stephen S. Colvin, "The Lesson Plan and Its Value to the Student-Teacher," *The Eighteenth Yearbook of the National Society for the Study of Education*, pp. 190-212.

For prospective painters and decorators much more time would be devoted to such an aim. For a lesson one of the aims might be "to study the characteristics of shellac" or "to teach pupils how to use shellac as a filler on new wood."

(4) *The aims should vary from lesson to lesson.* A teacher of printing might indicate, lesson after lesson, that his aim is "to teach hand composition," but such an aim is too general. An instructor in automobile mechanics might report that his lesson aims for several days in succession are "to teach the principles of internal-combustion motors." Again the aim is too vague. An instructor in beginner's electricity may report his aim to be, "to teach bell work and house-wiring," and this also illustrates indefiniteness and repetition. It is granted that a period of days may well be spent in teaching any of these units of learning. But each lesson should take up a different aspect of the work, and in planning for this the instructor should set up different specific aims for each lesson or period of work. If this is not done there is grave danger that the instruction will become very routine, cut-and-dried, and deadening. Without varying the specific aims the pupils will miss the milk in the coconut.

(5) *Avoid setting up too many aims for a single period of instruction.* It is contrary to good teaching practice to undertake too many different things in a single period of instruction. It leads to superficiality in thinking and to mediocrity in manipulative skills. Inexperienced teachers do not always realize that the pupils cannot be expected to do the same amount and quality of work that can be done by the teacher—it probably took the teacher a number of years to acquire the ability. A lesson-plan that includes the following items embraces too many aims for a single period: (a) to lay out a common rafter; (b) to lay out a hip rafter; (c) to lay out a valley rafter; (d) to lay out a jack rafter; (e) to lay out a rafter for a "curb" roof.

When the instructor feels that he does not have time enough to cover the ground planned, he is likely to overlook essential points, and the pupils are inclined to become confused by the mass of facts and demonstrations that may be provided in the limited time that is available. It is better to learn a few fundamental things well than to get a mere smattering of many things.

5. The general elements of lesson-plans. While lesson-plans should vary in content and form, depending upon the circumstances and conditions that are to be met, it may be helpful to give consideration to the elements, such as the following ones, that are sometimes included in lesson-plans of the more comprehensive type.

(1) *Purpose or aim.* The lesson-plan should contain a concise statement of the immediate aim or aims of the lesson. Certain suggestions have been made in paragraph 3 of this chapter.

(2) *Reference material.* Where applicable the lesson-plan should contain specific page references to the literature that will supplement oral discussion. The reference material may be of many kinds other than books, as, for example, sketches, drawings, instruction sheets, photographs, models, charts, and the like.

(3) *Methods and procedures.* A brief statement of methods and procedures to be used in the lesson is often helpful. This may include those to be employed by the teacher and others that will be used by pupils. In the latter case the points will serve as reminders to the teacher that certain explanations may be in order.

(4) *Correlation with previous learning.* Indications as to how the forth-coming lesson "ties in" with previous lessons and with other "subjects" in the curriculum are helpful. A reasonable length of time spent in integrating instruction is very desirable. In some instances review questions and drill will be appropriate.

(5) *Leading questions or key expressions.* A limited number of tersely worded leading questions, or of key words or expressions that touch upon vital spots of the lesson, is used effectively as a part of lesson-plans.

(6) *Tools and materials.* Consideration should be given to the tools and materials that are to be used. Is there supplementary information, or are there specific tool practices that are to be demonstrated? What modifications in design or in procedure must be made in view of the nature of the tools and materials that are to be used?

(7) *Safety factors.* It is assumed that pupils have been made familiar with the general shop or laboratory hazards and that

they know how to work safely as individuals and as a group. But, in addition to this, specific processes may involve hazards that are not well understood. If such are involved in the lesson, then concise references are desirable in the lesson-plan.

(8) *Visual aids.* A statement or reference to appropriate forms of visual aids that will make the lesson more effective is often helpful as a part of the plan.

(9) *Testing or measuring achievement.* Brief oral testing or the use of relatively short objective, "new-type" tests may fit into the lesson. Objective measures of achievement are likewise suggested where they are practical.

(10) *Summaries.* In certain types of lessons, particularly those involving oral discussion, it is appropriate to plan for summary statements which bring to a focus the main points covered. The lesson-plan may well include a list of such essential points.

(11) *The assignment.* Lesson assignments are essentially a part of the lesson. The effort that will be expended upon the lesson will depend in large measure upon how well the assignment was made. Good lesson-planning calls for making assignments in such ways that they will be clearly understood and so that the pupils will be interested in undertaking them.

(12) *Suggestions for improvement.* It is often helpful to amplify or modify plans on the basis of experience with them. In shopwork, notes concerning the time required for the units of work covered, of unlooked-for difficulties that arose, of improvements that can be made in methods, processes, design or use, and of cost data are likely to prove helpful for future use.

6. *Desirable characteristics of lesson-plans.* There are certain features or characteristics that are sought in lesson-plans. These vary according to the purpose and the use to which the plan is to be put, but it may be helpful to list some of these characteristics as an aid to lesson-planning.

- (1) Lesson-plans must conserve time and energy. Lesson-plans can be justified only when they aid the teacher and when they result in improved teaching.
- (2) Lesson-plans should be definite, specific, objective, and practical.
- (3) They should place the emphasis on pupil activity and learning rather than on teacher activity.

- (4) The plans should provide for individual differences and for individual problems.
- (5) Lesson-plans should be flexible and adaptable to changing requirements and to enrichments from contemporary life experiences.
- (6) They should contain provisions for motivating learning and for evaluating educational accomplishment.
- (7) They should integrate knowledge, skill, and appreciational insights and contribute toward the larger social-economic objectives of education.

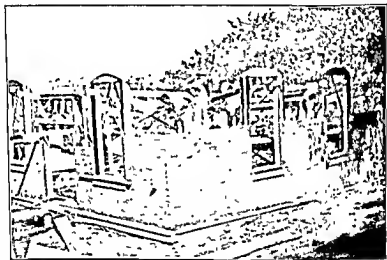


FIG 17. Students of the Williamson Free School of Mechanical Trades, Williamson School, P.O., Delaware County, Pennsylvania, receive excellent trade training. This picture shows some of them erecting the new laundry building for the school.

7. What to avoid in lesson-planning. There are a few characteristics that are occasionally met with in lesson-plans that should be avoided. Several of these features will now be mentioned.

(1) *Verbalism*. This term is used to describe the practice of using words in a meaningless sort of way and of using more words than are needed to express thought adequately. Verbalism is to be avoided, not only in lesson-plans but also in all serious writing. People have an uncanny way of recognizing writing that smacks of stuffed shirts and high hats. Teachers do not like it

when pupils say little in many pages of writing and supervisors feel the same way toward lesson-plans that are expanded unduly. Too much detail may detract from the value of a lesson-plan.

(2) *Lack of sufficient content.* But one may err in the opposite way even more easily—in the direction of making the lesson-plan so scant and brief that its value will be impaired thereby. For the beginner it is safer to write out lessons at considerable length than it is to attempt to “boil them down” to what more experienced teachers find adequate. One difficulty with the very brief plans, when used in observation and practice teaching or by beginning teachers, is that the supervisor has difficulty in judging what is embraced in the plan. A few brief sentences, leading questions, and key words are not enough to reveal what is contemplated. If the plan is merely for personal use, the case is different.

(3) *Vagueness and generality.* Individuals differ considerably in their ability to visualize problems and situations. It is good training to practice the art of stating plans as clearly and definitely as possible, thus avoiding ambiguity and vagueness as to what is intended.

(4) *Unnecessary formality.* Traditional lesson-planning is too formal. Much credit is due to Herbart and his followers for what they did to improve the educational practice of their day. But the “five formal steps”—preparation, presentation, application, generalization, and evaluation—or slight modifications of these steps have grown in disfavor as the newer educational psychology has pointed out the weaknesses in such a formal, teacher-centered form of planning. Thomas indicates that “the reaction against formal method has gone so far as to raise the question as to whether there should be any definite preliminary lesson planning at all.”⁴

Among the criticisms that have been made of the formal type of lesson-plans by Mossman and others may be mentioned:

- (1) Such plans do not sufficiently recognize the growing, emerging needs of pupils.
- (2) They are concerned too much with imposed subject matter

⁴ Frank W. Thomas, *Principles and Technique of Teaching*, Boston, Houghton Mifflin Co., 1927, p. 252.

and not enough with developing thinking, initiative, and resourcefulness.

- (3) They require too much writing and hence are wasteful (to the extent that this is true) of the teacher's time.
- (4) They tend to center the interest in subject matter rather than in the pupil.
- (5) Formal plans are based on an outmoded psychology and on unsound pedagogy.
- (6) No single lesson-plan is satisfactory for all forms of learning units.

Dewey has said: "The great need of industry and of social life is foresight, ability to plan, flexibility, originality and initiative."⁸ These abilities and qualities can be developed better through lesson-planning of the more modern type that definitely stimulates, guides, and furthers them.

8. Should lesson-plans be required? No doubt many readers will turn to this paragraph in the hope that this controversial question has been answered once and for all. In this they will be disappointed, for the answer should depend upon a number of factors, some of which are mentioned in this chapter. In analyzing a study dealing with lesson-planning, Roberts and Draper report that 145 principals replied that they require lesson-plans of teachers; that 260 indicated that they do not require them; and that 14 require them rarely.⁹ This same study reveals that of 149 principals reporting on the question, 37 ask for daily lesson-plans, 59 for weekly plans, 18 for monthly plans, and 35 gave indefinite answers. The present writer was unable to find a study which shows the current practice in industrial education, but, if fairly extensive oral inquiry of employed industrial teachers is a reliable index, it looks as if the practice of requiring written lesson-plans of shop teachers is much less common than in the area of "academic" education. And this is probably about as it should be. The objective nature of much of the shopwork makes it unnecessary to write out as detailed lesson-plans as

⁸John Dewey, "Progressive Education," an address reported in the *News Bulletin*, American Vocational Association.

⁹A. C. Roberts, and E. M. Draper, "The High-School Principal as Administrator," pp. 145-6. Quoted by Douglas and Waples in *Supervision in Secondary Schools*, pp. 300-1.

would be required for equally effective teaching in forms of education that are primarily oral and graphic.

Douglass and Boardman are of the opinion, which will find hearty support on the part of many, that writing out lesson-plans has become an unwelcome task in many, if not in most, secondary schools where it is required. They suggest that they be not required unless they will be used in part as a basis for supervision; that perhaps it would be best to require them regularly only of inexperienced teachers and only occasionally of all teachers.⁷

9. Some difficulties met in lesson-plans. A study was conducted at the University High School, Minneapolis, which throws light on the question: "What are the difficulties that are most frequently found in lesson planning by prospective teachers?"⁸ The following eight items are given in the comparative rank order of difficulty, arranged in a descending order, as reported in this study.

- (1) Providing for individual differences.
- (2) Summarizing chief points of the lesson.
- (3) Apportioning time to each activity of the recitation.
- (4) Overestimating the amount a class can cover in a single recitation.
- (5) Connecting new lesson with subject matter of previous recitation.
- (6) Choosing good illustrative material.
- (7) Selecting supplementary material.
- (8) Underestimating the amount a class can cover in a single recitation.

10. Lesson-planning by units. Lesson-planning in the practical arts and in vocational education is logically organized in units of instruction rather than in terms of periods or days. A pupil's project plan is his lesson-plan. It may take several weeks to complete it. For group activities the case is the same. The school period or day merely limits what can be accomplished—the individual projects and the group projects form the proper basis for lesson-planning.

⁷ Harl R. Douglass, and Charles W. Boardman, *Supervision in Secondary Schools*, Boston, Houghton Mifflin Co., 1934, pp. 300-1.

⁸ Ernest M. Hansen, "Classroom Difficulties of Student Teachers," *Scientific Method in Supervision*, Second Year Book, 191, 106-29.

And since individual work is, or should be, the typical rather than the unusual procedure in industrial education, lesson-planning must take this into account. It is obvious that where there is much individual work there can be no uniformity in starting each of a series of projects, unless the more able pupils are either given extra work or are kept from working at their best pace. It has become a common practice to encourage all pupils to proceed as fast as possible (this is so much better than the old system of regimentation where every pupil was expected to work on the same joint for the same length of time), and lesson-plans are arranged so that this is encouraged. To illustrate: A teacher has a suggestive list of units of work—they may be projects which are arranged in an approximate order of learning difficulty. No one is retarded by others. A progress chart kept up-to-date by the pupils individually, by a pupil shop foreman, or by the instructor indicates clearly how far each pupil has progressed at any time. It shows what he has done and what is expected of him. It serves as an incentive, as a record of accomplishment, and as a form of lesson-plan for the instructor. But such a progress chart should not be regarded as a complete lesson-plan.

11. **Project analysis as a basis.** For certain types of lessons, such as those based upon a shop project as the unit of instruction, project analysis serves as the foundation for the lesson-plan. To illustrate this, let it be assumed that the project is to make a book-stand. (It will make no appreciable difference whether the instruction is to be on an individual or on a group basis.)

The teacher's project analysis, of work to be done by pupils with teacher guidance, which can be indicated in brief form and which will serve as a check-sheet or form of lesson-plan, may be written in the following manner:

A. Title: *How to make a book-stand.*

B. Project analysis.

- (1) Planning the project
- (2) Make sketch, drawing, or blue-print.
- (3) Write out specifications.
- (4) Make out bill of material and estimate costs
- (5) Cut out material
- (6) Shape material to exact sizes.
- (7) Discuss new operations involved and demonstrate.

- (8) Points on smoothing, scraping, sanding.
- (9) Suggestions on assembling.
- (10) Discuss types of finish.
- (11) Demonstrate staining, filling, varnishing, or lacquering.
- (12) Discuss selection of appropriate hardwood and demonstrate how it is applied.

Such a lesson-plan may require a number of class periods for carrying out its provisions—it represents *unit* planning that appears to be logical and psychologically suited to industrial education.

Another project analysis, prepared by a teacher of vocational patternmaking and kept by him on 4 inch by 6 inch cards labeled "Job Analysis," will illustrate his way of keeping a brief outline for each shop project.*

Project No. 1. Job Analysis. Planing Block Straight.

1. Tools needed. Reference—Stanley Rule and Level Company Charts.
 - a. A sharp smoothing plane
 - b. A try-square
 - c. A marking gauge
 - d. A bench knife
2. Block planed straight and square on all sides.
 - a. Plane straight on one flat side first. Use blade of square to check for (1) straight with the grain; (2) across the grain; and (3) across corners.
 - b. Use gauge for parallel thickness, and parallel width.
 - c. Use square often and plane off only high spots.
 - d. After parallel thickness and width is obtained plane one end straight, but never plane to the extreme end. Before reaching it reverse plane and again plane toward the center. This avoids breaking off the edge.
 - e. Keep plane sharp and plane the opposite end in the same manner.

As an additional aid in effective planning, this instructor has each pupil keep a record (also on 4 inch by 6 inch cards) of the projects that he has completed and the time in hours that were required for each project. At the end of the term the total number of hours are summarized and recorded. Employers often want to know how much training a boy has had in certain types of work. It is an advantage to be able to make such a report very definite by putting it in terms of hours of instruction.

*Used with the special permission of the author, Austin M. Cressman.

12. Your "kit of tools" in lesson-planning. For purposes of industrial education, lesson-planning is aided with such "tools" as those herewith mentioned in Table VI.

TABLE VI
YOUR KIT OF TOOLS IN LESSON-PLANNING

(1) Sketches	(9) News clippings	(17) Rating scales
(2) Drawings	(10) Trade literature	(18) Tests
(3) Diagrams	(11) Notes	(19) Trade terms
(4) Charts	(12) Photographs	(20) Definitions
(5) Tables	(13) Slides	(21) Trade analyses
(6) Blue-prints	(14) Films	(22) Pivotal questions
(7) Instruction sheets	(15) Objects	(23) Check lists
(8) Posters	(16) Models	(24) Topical outlines

In form the lesson-plan should be *simple*—it may vary from a brief memorandum stated in a few words to more detailed plans prepared with considerable effort. *Under no circumstances should lesson-plans be wasteful of time.* If they are not aids in effective and efficient instruction, they are of questionable value and had better be replaced by something for which a positive case can be made out.

Lesson-planning can be done without writing out the plans. In instruction that is largely objective in character—such as shop and laboratory work—there appears to be less need for extensive notes than in the lessons that are largely oral in nature. This distinction is sometimes overlooked. On the other hand, it is probable that the time spent in preparing a suitable plan in written form will be time well-spent—at least for beginning or inexperienced teachers. The amount of writing that should be done and the form of the plan should be suited to each individual teacher. Just as the greatest leaders in political, economic, social, and business affairs differ in dependence upon notes when they appear at important meetings—some use them extensively, some sparingly, and some not at all—so teachers too differ in their ability to do their work effectively without access to written plans. But just as the man of public affairs would not choose to face his tasks without previous thought, so teachers—whether they use written lesson-plans or not—are committed to planning their work.

13. Using a "job report" to develop planning ability. It has been found that job reports which are made out by pupils have distinct educational value. Bushfield indicates that this form of report, the essential features of which are herewith listed, has proved practical for the related technical classroom, and that it can readily be adapted to different trades.¹⁰ These are the points upon which each pupil is asked to report:

- (1) Name of the job.
- (2) Why the job is undertaken.
- (3) Operations listed in sequence.
- (4) Tools required.
- (5) Trade terms and definitions that are new.
- (6) Provide a sketch, diagram or drawing of the job.
- (7) List of technical topics or scientific or mechanical principles involved.
- (8) List the safety precautions.
- (9) List the references used in the report.
- (10) Make a proper record of the job.

Fryklund believes that the "plan of procedure" or the "job plan" is helpful in teaching pupils to think through their jobs and in encouraging them to plan their work, much as all persons doing creative work must do. Such a job plan is not to be confused with the type of job sheet in which pupils merely follow directions.¹¹ (See sample job sheet on following pages.)

Willoughby and Chamberlain have voiced a conviction shared by many teachers of industrial education, namely, that cost and time elements should be stressed in job plans.¹² The world of work looks for results. If the time elements in industrial arts and vocational education are overlooked, the pupils may develop habits of work that will handicap rather than aid them in later years. Wise selection of materials cannot be made without carefully considering comparative costs.

¹⁰ Gordon Bushfield, "Individual Instruction," *Industrial Education Magazine*, Vol. 31, No. 3, March, 1930, p. 339. (Used by special permission of the publisher, the Manual Arts Press.)

¹¹ Verne C. Fryklund, "The Plan of Procedure," *Industrial Arts and Vocational Education*, Vol. 20, No. 3, March, 1931, pp. 77-9.

¹² George A. Willoughby, and Duane Chamberlain, *Industrial Arts and Vocational Education*, Vol. 24, No. 12, December, 1933, p. 363.

SAMPLE JOB SHEET*

Date Tested: October 22, 1934

Electrical Wiring

Industrial Arts

Job Sheet No. 6

Unit Conduit.

Job Started Oct. 6. Time .345.

Name.....

Job Finished Oct. 22. Time .915..

Section .9-2.. Team .D..

Total time .334 . hr.

Grade

A	W	T	Av.

Terminals

Splices

THE JOB:—

To install an outlet controlled from two different locations.

Specifications:

Use $3\frac{1}{4}$ " octagon boxes, $3\frac{1}{4}$ " porcelain bushed cover, $3\frac{1}{4}$ " blank cover, $3\frac{1}{4}$ " spider cover, reinforced cord, conduit ell and supplies, pipe straps, porcelain pendant keyless socket, wire and screws.

Use this space for the connection diagram:

(Note. Sketch was omitted in this reproduction)

TIME SHEET:—Record all time in minutes, reduce total time to hours and minutes.

Date	Minutes	Date	Minutes
October 6—1934	40		
" 8—"	50		
" 13—"	50		
" 15—"	50		
" 22—"	35		
	225		
	3 hours—45 minutes		

Use this form for the bill of materials.				
Quantity	Description of article	Catalogue		Price
		Name	Number	
4	3½" Octagon boxes			
6	½" Bushings			
6	½" Lock nuts			
2	½" Pipe couplings			
1	6" Conduit nipple (½")			
2	12" " " (½")			
2	12" " ell (½")			
2	3 P. Surface snap switches			
2	3½" Spider covers			
1	3½" Blank metal cover			
1	3½" Porcelain bushed cover			
1 PC.	Reinforced Cord, 18" long			
1	Porcelain pendant socket			
3'	#14 Wire (White)			
12'	#14 Wire (Black)			

Use this space for the "step by step" procedure. <ol style="list-style-type: none"> 1. Locate centers 2. Install conduit—fasten to board 3. Install wire 4. Make splices 5. Connect devices 6. Check 7. Test 8. Report to instructor 9. 10.

14. Check-lists as guides. For six years, 1928 to 1934, a committee of the American Vocational Association, known as the "Committee on Standards of Attainment in Industrial Arts Teaching," has worked on a report that contains a large number of teaching "units" which are being used in a number of ways.¹² One of these ways is to check courses of study and lesson-plans against the list in order to determine the extent to which they coincide in content with the suggested list prepared by the committee. The units are listed under the following three heads: (1) "the things you should be able to do"; (2) "the things you should know"; and (3) "what you should be."

It is not the objective of the committee to standardize industrial arts education or to determine which specific experiences should be incorporated in the teacher's plans. The units are presented to set up goals and to indicate what the committee believes to be feasible methods of selecting, organizing, and presenting worth-while experiences. Several sample lesson-plans are included in this report. The report specifically indicates that the list of units "should not be considered as 'topics' or 'assignments for study' and taught *as such*," but that the report can be used to improve the quality and effectiveness of the teaching that is done.

15. Planning the first lesson. The first lesson of any series presents certain opportunities that deserve special consideration. One of these is to get the right start for the term. This involves: (1) establishing friendly, professional relationships with the new pupils; (2) giving them an over-view of the general nature of the learning experiences that they are about to begin; and (3) stimulating their interests so that they will want to attack the work of the term with the right mental attitude and with some appreciation of what the course is to contribute. A second opportunity is that of having the work of the first lesson so organized and planned that the pupils will readily recognize that the instructor knows his job and that he will expect each individual member of the class to exert his best efforts. First impressions are important.

¹² American Vocational Association, *Standards of Attainment in Industrial Arts Teaching*, Washington, D. C., 1934

In order that the first lesson may be adapted to the group, it is desirable to get a fairly accurate mental picture of the individuals—of their home backgrounds, their previous out-of-school experiences, their probable present interests and characteristics, and their previous school training. The teacher should be prepared to adapt his plans to conditions as they develop.

Many instructors devote considerable time during the first lesson to "selling the course" to the class. When this is done it is well to put the emphasis on *opportunities for worth-while individual growth* and development rather than on the "course of study." Where the class periods are short, say 45 to 60 minutes, some shop and drafting teachers use the entire first period in motivating the work that is to be given; in taking the roll, which in this case may include having the pupils write their names and addresses on paper as a means of checking existing records; in explaining safety and other regulations, customs and standards of behavior; and in a little tour of inspection through the shop, during which new and interesting features are pointed out.

If the class period is longer—and even when it is not—some prefer to devote only 10 minutes or so to "preliminaries" and then have the pupils start their work. The argument is advanced that it is better practice to have more frequent but short discussion periods; that pupils take shop courses because they want to make things—not to talk too long about what they are going to do. The following lesson outline is for a class of beginners in mechanical drawing.

LESSON OUTLINE

Seventh Grade Mechanical Drawing

Lesson I. Time—50 minutes.

1. *Purpose:* To meet the class for the first time; to give a brief over-view of the nature of the work of the term; to teach pupils how to lay out a standard plate.
2. *Information to be acquired.*
 - a. Care of instruments
 - b. How to sharpen drawing pencil
 - c. How to use T-square and triangles
3. *Skills to develop.*
 - a. Square-up sheet on board.

- b. Lay out border lines and title space.
- c. Use of "full-size" scale.
4. Questions bearing on lesson—testing understanding, appreciation, and knowledge.
5. Brief discussion of problems or difficulties encountered.
6. Assignment of next problem (including motivation).

16. Instruction sheets supplement lesson-plans. The word "instruction sheet" is a generic term which includes four distinct types of material usually classified in the following manner:

(1) *Operation sheets*. These relate to specific operations to be mastered. An operation, in industrial education, refers to a unit

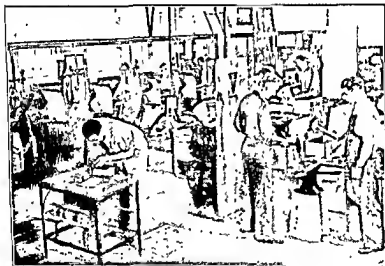


FIG. 13. A section of the general metals shop at the Stout Institute, Menomonie, Wisconsin

act or activity. In highly specialized factories the manufacture of a pair of shoes may involve a hundred operations. A skilled trade can be analyzed into many operations or essential elements. Operations are frequently the most logical units of instruction.

(2) *Assignment sheets*. These may vary considerably in form but essentially they specify or suggest collateral reading, study, inquiry, or drill. They may be of the problem type. They are

particularly helpful for home-work and for work that is to be done outside the school shop or laboratory.

(3) *Information sheets.* These contain specific items that relate definitely to the work in hand. They may contain suggestions for further study, and such sheets may include not only thought-provoking questions but also new-type test items that will serve as a check on the thoroughness with which the information has been mastered.

(4) *Job sheets.* These sheets concern complete work-jobs, and are not to be confused with operation sheets which deal with elements of complete jobs. Job sheets for beginners may well include more specific directions than would be appropriate in job sheets for more advanced individuals, who should be able to depend, to a greater extent, upon their own resourcefulness to determine how the job should be done.

These four types of instruction sheets *supplement* lesson-plans but do not replace them. Instruction sheets are definitely helpful in that they conserve the teacher's time. This is particularly true where much of the instruction is on an individual basis.

Working drawings or plans likewise supplement the shop teacher's lesson-plans, as do "contracts" dealing with specific units of learning.

A comparison of the accomplishment of pupils in mechanical drawing classes, where instruction sheets were used, was made with that of pupils in classes not using them.¹⁴ This study reveals:

- (1) That instruction sheets made it possible for the instructor to give more individual help than would otherwise have been possible.
- (2) Job sheets proved to be helpful to the average pupil.
- (3) Job sheets do not give too much assistance to pupils doing the C assignments.
- (4) Pupils doing A and B work grew in ability to plan their jobs, and they likewise improved in willingness to assume responsibility for their work.
- (5) They help pupils to organize their work.
- (6) They tend to develop self-reliance.

¹⁴ Richard M. Carlsen, "Individual Instruction Sheets," *Industrial Arts and Vocational Education*, Vol. 23, No. 9, September, 1934.

- (7) Pupils in the intermediate school have difficulty in getting information from the printed page.
- (8) The majority of the pupils like written instruction sheets.

17. Using questions. The art of questioning is very fundamental to good teaching and will be discussed at greater length in a later chapter. For present purposes it will suffice to call attention to the appropriateness of questions as a part of the lesson-plan, and to give an example that will illustrate suitable kinds.

The following questions which relate to shop theory in the unit "soldering" will illustrate questions that may well be included in lesson-plans.¹⁵

1. What is soldering?
2. What is the composition of solder?
3. What important operation is often overlooked in soldering?
4. What is flux and how is it used?
5. What is a soldering copper—make a sketch of three types?
6. Describe how you would "tin" a soldering copper.
7. How would you prepare a surface to be soldered?
8. Why use a flux?
9. What is the most commonly used flux in the machine shop?
10. Describe "killed" muriatic acid.
11. On what kind of metal is chloride of zinc used as a flux?
12. For what metals is chloride of zinc flux diluted?
13. Is muriatic acid ever used in a raw state as a flux?
14. What kind of flux is used for soldering copper and brass?
15. What kind of flux is used for soldering lead?
16. What kind of flux is used for soldering sheet tin?
17. Tell how to solder cast iron.
(etc.)

18. Some lesson-plan outlines. In order to supplement suggestions that have already been made in the foregoing discussion concerning the topics that may well be included in the lesson-plan, there are given herewith a few additional outlines. It will be understood that lesson-plans may well differ, from day to day or as needed, in the main points under which notations are made.

¹⁵ Henry Ford Trade School, *Shop Theory*, published by the School, Dearborn, Mich., 1934, pp. 1-4, "Soldering." (Used by special permission of the publisher.)

Plan A

Name of Job: _____

- (1) Explanations and motivation
- (2) Tools and materials
- (3) New procedures or principles
- (4) Precautions
- (5) Questions
- (6) Testing or drill

Plan B

- (1) Purpose
- (2) Materials
- (3) Hand tools
- (4) Machines
- (5) Operations
- (6) Safety rules
- (7) References

*Plan C*In essence the lesson-plan should include:¹⁶

- (1) A list of things that are likely to take place, given in sequential order. The amount of detail will vary with experience and the nature of the work to be done.
- (2) A notation of such details of subject-matter as the teacher may find valuable. In many instances such a memorandum will not be needed but when the material is new or is presented in a new way it may be helpful.
- (3) An indication of the assignments that were agreed upon, of illustrative or constructive materials that may be helpful, and of references that are pertinent.

"The degree of detail written out in the plan should depend upon the degree the teacher feels she needs."

Plan D

- (1) Name of project or unit of work
- (2) What pupil should be able to do
- (3) What he should know
- (4) Questions
- (5) References

Plan E

- | | |
|------------------------------|------------------|
| (1) Aim | (5) Presentation |
| (2) Assumed knowledge | (6) Application |
| (3) Materials of instruction | (7) References |
| (4) Introduction | |

PRACTICAL SUGGESTIONS FOR TEACHING

In conclusion, what are some of the more pertinent concepts of this chapter that can be used in teaching? The following ones may be suggestive:

1. Lesson-plans are essentially teacher-aids. For advisory or

¹⁶ Lois C. Mossman, *op. cit.*, pp. 59-60. (Used by special permission of the publisher, Bureau of Publications, Teachers College, Columbia University.)

¹⁷ For a more detailed statement of this plan, see *A.P.A. Standards of Attainment in Industrial Arts Teaching*, pp. 79-81.

administrative purposes they are a waste of time—the supervisor can best judge the teacher in action.

2. Lesson-plans should be flexible in outline, should vary in amount of detail and in treatment with the nature of the work to be done and the experience of the teacher.

3. Instructional planning should combine long-time, short-time, and daily planning.

4. The planning that is done from day-to-day, in line with valid goals, is probably more effective than planning that was done a week or more in advance.

5. In planning the daily work recognize out-of-school as well as school experiences.

6. Wherever possible "tie-in" the instruction with contemporary life problems.

7. Lesson-planning should help to humanize, not mechanize, instruction.

8. Lesson-plans are aids in getting pupils to think rationally rather than emotionally.

9. Written lesson-plans should not become a crutch. Develop the ability to carry out your teaching plans without having to refer to them at all, or seldom, while teaching.

10. The less formal, the more likely they are to function effectively.

FOR DISCUSSION

1. What reasons are there for believing that daily lesson-planning is worth while?

2. Compare the need for planning in teaching with the need in engineering, business, agriculture, or homemaking.

3. Compare lesson-planning for individualized instruction, such as is typical of industrial education shopwork, with group instruction.

4. Enumerate the chief advantages of instruction sheets. What are their disadvantages?

5. Describe four types of instruction sheets.

6. What is the advantage of including specific questions in job sheets?

7. Illustrate the difference between instruction that is pupil-centered and that which is teacher-centered.

8. Give examples showing the difference between definite and specific lesson aims and those that are too general.

9. What can be said in favor of using the "five formal steps" as a basis for lesson-plans? What are the chief disadvantages?

10. Distinguish between a "job report" and a "job sheet."

11. In what way does lesson-planning help the instructor to provide more effectively for individual differences?
12. How may lesson-planning serve as an incentive for making adequate preparation for instruction?
13. Explain how lesson-plans should be used.
14. How closely should lesson-plans be followed?
15. How far in advance of their use should lesson-plans be prepared?
16. Illustrate how lesson-plans may indicate correlation with life situations.
17. Explain the value of summarizing the chief points in the discussion type of lesson.
18. Make an outline of a lesson-plan that suits your requirements. Defend its provisions.

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CHAPTER IX

THE ART OF QUESTIONING

A DISCUSSION OF ONE OF THE GREAT MEDIUMS OF INSTRUCTION

1. The importance of questions. The question is an age-old medium of learning. Charters has well called it a "racial tool," for it is generally recognized that for generations questions have been one of the most important means of stimulating thinking and learning. In one of the oldest treatises on education, *Plato's Republic*, is found the following statement: "Then you will enact that they (the rulers) shall have such an education as will enable them to have the greatest skill in asking and answering questions." In her fine, constructive study of the technique of questioning, Miss Stevens has called attention to the fact that questions may serve as a rich opportunity for true education.¹ Rightly used the question will bring the minds of the learner and of the teacher into closest touch; good questioning will be a means of motivating mental effort, of stimulating reflective thinking, and of leading learners to creative effort. Good questions, by their very nature, are educative, and they have a very prominent place in all kinds of learning. If used in the right way, at the proper time, questions lead to new realms of understanding; they serve as means of organizing knowledge; of correlating the results of educative experiences; of tying together units of learning; and of integrating personality. Good questions lead to deeper appreciations and to clearer understandings; they lead also to socially valuable insights and to constructive attitudes.

Good questioning is an art. Like all arts it calls for unusual personal skill to be worthy of that designation. Miss Stevens' pioneer analysis brings out the fact that the entire range of ques-

¹ Romiett Stevens, *The Question as a Measure of Efficiency in Instruction*. New York, Teachers College, Columbia University, 1912.

tions that a teacher will use cannot be prepared in advance; that good questioning calls for insight, for ability to diagnose, for ability to draw out and to lead intellectually. The procedure must not be mechanical but original, adapted to the situation, creative—like all good art. Her study clearly shows that many teachers ask too many questions, in too rapid succession, thus depriving pupils of sufficient opportunities to think reflectively. It is probable that the reason for this lies in the fact that such teachers have not mastered the fine art of good questioning. Indeed it is conservative to say that they have not been taught how to use questions effectively. It is in the hope of helping to remedy this all too prevalent situation that consideration is here given to this important form of instruction.

2. Guiding principles. There are a few basic considerations that are helpful toward improvement in the art of asking questions. Among these the following ones are suggestive:

(1) *Questions should be clear.* Clarity is secured by using words that are understood by those to whom the questions are addressed. A question that is clear to senior high school pupils may be vague to those in the junior high school because of the difference in vocabulary ability. In order to be clear, questions must be put in terms that the individual *fully* understands. His previous environment has much to do with the range and nature of the words that he comprehends. Mental maturity is not a safe index of an individual's ability either to understand or to use words. This is particularly true of persons of foreign parentage who are relatively unfamiliar with English. When new words are used, which is frequently desirable, they should be explained as they are introduced.

But clearness also depends to some extent upon sentence structure and length. Questions should not only be stated in words that are within the vocabulary range of the learner but they should also conform to the standards of good usage, and they must not be too long. Oral questions should be short enough to be easily remembered. If the question must be long, it should be written. Since exactness in nomenclature is conducive to advancement, medical, engineering, and educational literature illustrates how new terms are used to describe more accurately that which is

portrayed. It is frequently wise to employ new key words in written lessons, questions, and assignments. Here the situation is different from that in oral questioning, for the dictionary may be used as a study aid, and the new words as given in such written questions may be included for drill or mastery purposes.

(2) *Questions should be definite.* A question may be expressed in words that are clearly understood, and yet the question may be vague. For example, the expression "how about it?" is of such a nature. To ask "what happens when it rains?" illustrates the same thing. Questions should be specific rather than general; definite rather than ambiguous. Thorough familiarity with subject matter is very helpful as a basis for asking questions that are clear as well as definite, but it is conceivable that an instructor may know his "subject" rather well and yet have difficulty in employing questions that are up to standard.

(3) *Most questions should stimulate pupil activity.* In the classroom such pupil activity may be almost exclusively mental; in the laboratory, the school shop, and out of school the question is often employed to stimulate motor as well as mental effort. In many settings that are natural and life-like, questions directly motivate both forms of activity—mental and manipulative work goes hand-in-hand.

In order to be stimulating questions must have a personal appeal. Questions addressed to the class as a whole are sometimes uninteresting to some individuals in the group, because no class is composed of a group of identical persons and what appeals to some will not be interesting to others. Individual differences in *past experiences, present interests, capacities, and ambitions* contribute to this. It would appear, therefore, that general questions should, in the main, be reserved for drill purposes, for testing, and for topics of general appeal, and that the class time will be used best, in the main, if questions are directed toward clearing up individual difficulties and in stimulating pupil activities.

(4) *Questions should help to unify learning.* Excluding certain types of questions, such as those that call for rote memorization or drill for mastery, many questions should tend to unify knowledge and experience. Good questioning, which proceeds in a logi-

cal sequence, should aim to unify concepts that might otherwise be isolated; to correlate the results of study and experience; and to relate one "subject" with others and all with contemporary life, to the end that the individual will develop into an integrated personality. It is true that life activities are often piecemeal, diverse, and unrelated. A certain amount of such experience in and out of school is both inevitable and adds to the zest of living, but a good case can be made out in favor of systematically organized instruction and of questions that seek to unify and relate units of learning, as a means toward keener insight, broader vision, deeper appreciations, and more effective participation in cooperative living.²

The organization and unification of knowledge and experience are but steps toward an evolving culture—steps that are increasingly important in a fast-moving social and economic order.

3. Types of questions. As a means toward mastering the art of formulating questions it is well to understand certain fundamental differences as well as points of similarity that exist between various types of questions. The fact that a question may be of such a nature that it does not clearly fall into any one of the designated types, or that it may be used for more than one purpose, does not prove that a study of the more common types is without advantages. Questions may be grouped roughly into two main types, namely: (a) those that call for factual answers involving, primarily, rote memorization, and (b) those that call for thinking of a higher order. In their excellent critical discussion of questioning, Strayer and Norsworthy refer to the following types of questions:³

(1) *The factual answer type.* This type calls for facts as answers, but not for selective thinking.

(2) *The recall type.* This, like the preceding type, involves memory but differs in that, in addition, it calls for selective thinking.

(3) *The comparison type.* This type includes questions that call for all sorts of comparisons—such as those of material char-

² William C. Bagley, "Is Subject Matter Obsolete?" *Educational Administration and Supervision*, 21:401-12, September, 1935.

³ George D. Strayer, and Naomi Norsworthy, *How to Teach*, New York, The Macmillan Co., 1918, pp. 213-19.

acteristics, as "compare varnish with lacquer as a finish for wood floors"; of processes, as "compare the Solvay with the Le Blank process of manufacturing soda ash"; of plans, as "compare the plans of trailer A with those of trailer B." These and other forms of comparison questions are valuable educationally because they call for analytical thinking.

(4) *The type calling for judgment.* It is in this type of question that thinking is best developed. Questions calling for the pupil's evaluation, for criticism, and for suggestions for improvement come in this group. The following question is an example: "What, in your judgment, is the best fly for catching trout, today, in this stream?"

(5) *The appreciation type.* Questions of the appreciation type are among the most difficult to formulate because the critical attitude and the appreciative one tend to inhibit one another. Appreciation is largely emotional, whereas critical examination is intellectual. Questions of the appreciative type often call for a sense of imagery and imagination such as great artists are known to possess, whereas critical evaluation calls for a scientific sort of intellectual activity.

There can be no hard and fast line of differentiation between the types that have just been set forth, even though obvious differences are apparent. If the five types mentioned were to be rated on a scale beginning with those of least, to those of greatest, educational value, they would no doubt be placed in the order in which Strayer and Norsworthy arranged them.

An extensive list of types of questions was made by Monroe and Carter.⁴ Their classification differs primarily from the one just given in that it carries the classification into greater detail. For comparative purposes it is listed on page 206 without the explanatory comments given in the original report.

4. *Purposes of questions. Principles and general rules* have their value in helping the young teacher formulate and use questions effectively. But rather than depend too much on rules, it is better to take into consideration the underlying purpose that the

⁴For a more detailed description, see: W. S. Monroe, and R. E. Carter, *The Use of Different Types of Thought Questions in Secondary Schools and in Their Relative Difficulty for Students*, Bulletin 14, Bureau of Educational Research, 1923, Urbana, University of Illinois. (Used by special permission of the authors.)

TABLE VII
 TWENTY TYPES OF QUESTIONS

1. Selective recall—basis given.
2. Evaluating recall—basis given.
3. Comparison of two things—on a single designated basis.
4. Comparison of two things—in general.
5. Decision—for and against.
6. Causes or effects.
7. Explanation of the use or exact meaning of some phrases or statement in a passage.
8. Summary of some unit of the text or of some article read.
9. Analysis (the word is seldom involved in the question).
10. Statement of relationships.
11. Illustrations or examples.
12. Classification (usually the converse of No. 11)
13. Application of rules or principles to new situations.
14. Discussion.
15. Statement of aim—author's purpose in his selection or organization of material.
16. Criticism—as to the adequacy, correctness, or relevancy of a printed statement, or a classmate's answer to a question on the lesson.
17. Outline.
18. Reorganization of facts (a good type of review question to give training in organization).
19. Formulation of new questions—problems and questions raised.
20. New methods of procedure.

question is to serve. Let us then consider briefly some of the more important purposes for which questions are employed.

(1) *To motivate assignments.* The good question is a splendid tool that the instructor has at his disposal to arouse curiosity, to appeal to the intellect and to the emotions, and in other ways to develop incentives for educational activities, both mental and motor. If pupils can prepare their assignments with definite questions in mind that need to be solved, and if they clearly recognize the specific goals as well as more general outcomes that are involved they will tackle their job with greater vigor than when they are not sure of what is expected of them. Key questions are excellent for purposes of motivating assignments.

(2) *To stimulate interest.* Although the stimulation of interest is a function of well-made assignments, there are broader applications. Interest must be maintained throughout the class period, and properly chosen questions, raised at opportune times, help to perpetuate interest. Drill, for example, whether mental or manipulative, is likely to become tiresome if long repeated. Vari-

ous forms of incentives, including the question, can be used to maintain learning zeal on a high level.

(3) *To promote initiative and originality.* In a democratically conceived social order the pattern for efficient citizenship must provide adequately for the development of self-reliance, of independence of thought and action, and of originality. These qualities are among the broad, long-time goals of education. Daily learning can contribute toward them in ways that are at times clear and at other times hazy and indirect. "No child," Thorndike says, "becomes independent merely by being told to think for himself, or original merely by being ordered not to become a copy-cat."⁵ In order to develop such traits there must be actual habit formation in specific experiences. Initiative in physical combat does not guarantee originality in geometry and leadership in academic subjects does not assure initiative in industrial activities. Consequently initiative and originality must be furthered all along the line, in school and out of it; in the shop as well as in the classroom. The question, properly put by an understanding, sympathetic teacher, can do much to further these essential traits.

(4) *To secure cooperation.* In the democratic state cooperation is likewise imperative. Our hope for a brighter future rests, essentially, as Dewey, Kilpatrick, and others have so ably shown, in cooperative planning and striving toward unreached goals. The question can often be used most effectively to get individuals to see the need for cooperation, and in what ways the action can best proceed. A question directed at an inattentive pupil tends to bring him back into cooperative relationship. If it becomes known that inattention is quite certain to be interrupted with questions from the teacher, there will be less trouble in the future on that score. But "cooperation" has of course much broader implications than are involved in dealing with temporary inattention.

(5) *To encourage learning activities.* The question is at its best when it sets in motion strong inner urges to work along

⁵Edward L. Thorndike, "Education for Initiative and Originality," *Teachers College Record*, November, 1927, pp. 89-100.

socially justifiable, and economically sound, lines. The appropriate question spurs on thinking and culminates, in the case of shop work, in purposeful manipulative activity. Learning is aided most by asking thought-provoking questions that will also evoke motor activity—oral or written expression in the classroom and manual work where that is the aim. Such questions as "why should this be done in that way?" and "how do you propose to do that?" illustrate *thought-provoking questions*.

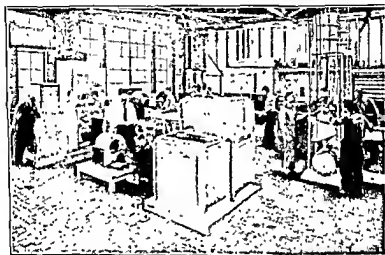


FIG 19 Among the more recent major developments in the building industry, air conditioning holds a prominent place. This view shows a group of students who are receiving instruction in air-conditioning at Dunwoody Institute, Minneapolis, Minnesota.

Effective learning is also furthered by using questions to bring out relative values and to give emphasis to what appears to be most worth while. Through questions that are wisely chosen the instructor can also encourage the learner to supplement his school experiences with collateral reading and out-of-school learning of various kinds. Learning is furthermore encouraged through questions that relate the work in hand to previous experiences. The pupil can thus see the relationships between what has been learned and what is about to be undertaken. This involves the

principle of "apperception," which is generally recognized as being an important one in good teaching.

(6) *To guide habit formation.* In an era when adaptation is at a premium, it is essential that the underlying reasons—the "why," "how," and "when" of things—are understood. So habit formation should go hand in hand with reasoning, and the question can often be used with effect to bring this about. To illustrate: "Why is oil used with rotten stone to produce an egg-shell gloss in finishing furniture?" This question gets at a basic principle which can be used to modify the habit formation learned. Another example has to do with questions that are directed with the purpose of getting the learner to understand the principles of color harmony so that if he should want to mix his own tints—as is often necessary in painting and decorating to match a given job—he can do so intelligently rather than by the wasteful process of trial and error.

In group discussion, questions should seek to evoke responses that are more than short statements; they should encourage connected discussion. The ability to discuss problems at length, to develop logical arguments for or against view-points expressed, is valuable to everyone. Questions may be so worded that they help to develop such ability.

The detail to which questions should go must depend largely upon the importance of the detail. In automobile mechanics the placement of the cotter-pin may seem like a small detail compared with the job of greasing and putting a front wheel back on the axle; but that cotter-pin is so important that the good teacher will make it plain that it is a most serious matter to forget to insert it. Questions are often used to check the pupil's understanding of such small but important matters as well as matters of broad application.

(7) *To develop attitudes and ideals.* In teaching the terms "primary" and "concomitant" learning are used. Primary learning refers to the specific lesson assignment or the chief things for which the learner will be held in that lesson. Concomitant learning refers to accompanying things—to what is learned at the same time. Attitudes and ideals are largely shaped through indirect, and often subjective rather than objective, forms of

learning. They are largely the product of concomitant rather than primary learning. There are good reasons for believing that concomitant learning may be as valuable, if not more valuable, than primary learning. Attitudes and ideals, though slow in evolving, are most important. From time to time, therefore, questions should be put that go beyond the bounds of narrowly conceived primary learnings—questions that strike at the heart of vital problems and help to mold social attitudes and worthy, soul-satisfying ideals, such as dominate the lives of the great men and women of all time.

(8) *To further insights and appreciations.* It is difficult to conceive of a person having genuine insight into human problems, relationships, and situations without also having familiarity with those problems. Insight can be deepened through intellectual effort that is stimulated or guided by thought-provoking questions. Insight goes deeper than the letter of the law; it finds expression in acts of true wisdom. The teacher who possesses insight into human nature knows that indirect suggestions are often more powerful than direct requests and that a well-framed question may be more provocative of reflective thinking than a host of direct factual statements. But experience and knowledge do not always lead to appreciation, for at times experience brings annoyance. The boy who is stung several times in attempting to take a hornet's nest may have more respect than he previously had for hornets, but he probably would not "appreciate" them more as a result of his experience. So it cannot be assumed that experiences in the school shop will, in and of themselves, result in that depth of understanding and that breadth of appreciation that is sought. Intelligent individual as well as group questions are effective means of revealing what might otherwise remain hidden beauty and buried treasure. Questions help individuals to see the charm of simple Colonial art; to appreciate the craftsmanship of primitive peoples; and to feel emotional thrill in the presence of such outstanding craftsmanship as the carved decorations in the world's great cathedrals and churches.

Questions are often used to assist individuals properly to appraise objectives, means, methods, and outcomes. In our fast-

moving generation it is important to weight relative values correctly. We have so many things that we would like to do if we could only "spare" the time and find the necessary energy. Sometimes we exhaust ourselves by being so exceedingly busy with our daily round of tasks that we permit great opportunities to slip by unnoticed. By gradually developing in pupils the habit of reflective thought, by getting them to seek criticism of the work they do, by appraising plans, projects, methods, and outcomes, we help pupils to grow in ability to analyze, to weigh, to compare, to select wisely, to buy with discrimination, and to choose activities with intelligence and insight.

(9) *To diagnose.* Diagnostic teaching seeks to anticipate and prevent wasteful learning. For purposes of diagnosing individual differences, individual difficulties, and individual points of strength and of weakness, the question is the natural and most commonly used tool. The questions, "how do you?" and "why do you?" are more revealing than "do you?" Another method of aiding diagnosis is to repeat the question in varying terms, as for example: (a) "What is your plan of attack?" (b) "How do you expect to do it?" (c) "Show me your project outline?" and (d) "What are the operations listed in sequence?"

When diagnosing problem-solving ability, questions starting with "explain," "describe," "interpret," "why," and "how" are suggestive.

(10) *For testing purposes.* An outstanding difficulty with the old-time tests and examinations has been that in the eyes of many teachers tests had their reason for existence solely for measuring achievement in learning. But the legitimate functions of questions that are incorporated in tests are very much broader than this in scope. Some of these have already been mentioned. They include motivating assignments, lessons, and reviews; diagnosing individual interests, aptitudes, and capacities; measuring teaching efficiency, determining pupil achievement; revealing special aptitudes and portraying attitudes, ideals, and personality and character traits.

Almack and Lang venture the opinion that there are more effective ways of drilling than to direct questions at pupils, one

after another.⁶ They favor the types of questions that result in topical recitations. As a result of her extensive study, involving a series of 100 classroom observations recorded stenographically, Miss Stevens shows that questions are generally used too thoughtlessly and so frequently as to defeat their high purpose and educational value.⁷ She found that the average number of questions that were asked during a day of school was 395. In a 40-minute period, 176 questions were asked in the German class; 88 in English; 120 in algebra; 61 in Latin; and 71 in science instruction given in the first year of high school. An equal number of replies were made in these same periods. The pertinent question that she raises is "how do they have any time to think?" She concludes that a good question is one that stimulates reflection; that is adapted to the experience of the pupil; and that draws forth a well-rounded thought.

5. How to ask questions effectively. The key word in the heading of this paragraph is the last one—"effectively." Anyone can ask questions, but to ask them purposefully and effectively requires understanding, insight, and experience. It is hoped that the points which follow may be of assistance, particularly to prospective and to relatively inexperienced teachers but also to other instructors who are more mature. With this by way of introduction, let us consider the specific items that follow.

(1) *Stating the question.* In line with principles already discussed in this chapter, the question should be stated clearly, definitely, and concisely. In group discussion it is usually best to state the question before calling upon an individual to respond to it. In this way attention is given, interest is held, and thinking is encouraged on the part of all. If a given individual is named before the question is put to the group, some members of the group may make little effort to think through the matter for themselves.

It is very desirable to cultivate the art of asking questions in a natural, conversational tone and to supplement the voice with a natural, easy manner. Both will tend to make the learner feel

⁶ John C. Almack, and Albert R. Lang, *The Beginning Teacher*, Boston, Houghton Mifflin Co., 1923, p. 215.

⁷ Roniott Stevens, *op cit*, p. 7

at ease and free from unnecessary worry or nervous tension. To snap out questions in the manner in which football signals are called will develop emotional states that inhibit free intellectual effort. An abrupt question is sometimes used with effect to overcome inattention or to check disciplinary difficulty which might otherwise develop. Questions should be addressed to pupils at random, or rather what appears to be at random, rather than in a fixed order.

(2) *Encourage development of thought.* It is good procedure for the teacher to encourage the development of thought and of powers of expression by paying close attention to the pupil while he is speaking. To do this has a good psychological effect upon the pupil and it also sets a good example to the rest of the class. It may be wise, occasionally, to give an indication of whether or not the pupil is answering in a satisfactory manner as he proceeds with the discussion, but in the main it is better practice for the teacher to give no indication, either favorable or unfavorable, as to what he thinks of the response while it is being made. The teacher may encourage the pupil, if necessary, to continue his discussion, and may even ask a supplemental question or two, but the aim should be to lead the learners to discuss a given topic or problem rather fully and without constant prodding by the teacher. The question may then be referred to others to see whether or not they agree with the response given. This may be done at times, particularly in questions involving analytical thinking, whether or not the question was answered satisfactorily by the first pupil.

In order to stimulate thinking it is not only necessary to show interest while the pupil is speaking, but much will depend upon what treatment the instructor gives to the response that has been made. He may: (a) call on others to evaluate the remarks or to express their personal opinion on the same topic, thus introducing the interesting elements of comparison and contrast; (b) comment on what was said in a way that will show the pupil that his reply did not fall on unresponsive ears; (c) emphasize certain good points that were brought out in the discussion; or (d) supplement what was said, himself.

(3) *Allow sufficient time for replies.* The time that should be

allowed for replies to questions is governed by such circumstances as the nature and difficulty of the question. Factual questions calling primarily for memorization should call for quick responses; short, new-type test questions, such as are sometimes given orally, for a brief period, for purposes of review and drill, should likewise be answered quickly and concisely—often with a “yes” or “no,” or “true” or “false”; whereas those questions demanding critical thinking and problem solving require more time. As has been previously indicated, many teachers err in the direction of asking too many questions and in not giving the pupil sufficient time to think things through for himself. In general, the time allowed should be enough to permit all members of the group to give the question adequate thought.

(4) *Recognize individual differences.* In a preceding paragraph the statement was made that “questions should be asked in an order that appears to be at random.” Those words were chosen deliberately. “Questions should be adapted to individual differences by adjusting the difficulty of the question to the capacity of the pupil. It is usually unwise to ask questions repeatedly that are too difficult for a pupil to answer. It tends to weaken his interest, destroy his self-confidence, and has a bad psychological effect upon other members of the group. There are times when the teacher will want to call upon those who are sure to respond well—it sets a good example and tends to set a standard that others will try to equal or surpass. But there are times, too, when the teacher will go in relatively easy stages toward more difficult aspects of the problem. At such a time he may want to call on the less gifted pupils first and reserve one or more of the most capable ones to give the discussion its finishing touches—to round it out or to summarize. In either event the pupils are not called upon in true random order, but it is important that it shall appear so to the class. Consequently there should be sufficient change and variety in the order in which pupils are called so that each pupil feels that every turn may be his, and at the same time the instructor should manage to adapt the questions to the varying capacities of the pupils.

Another way of guiding instruction so that each pupil may develop properly consists of so controlling the situation that a

proximate order of learning difficulty, beginning with the simple and going to the more difficult ones.

6. What not to do in questioning. By way of contrast it may be of interest to consider some of the things that should not be done in questioning, for purposes of instruction. Do not accept answers that are mumbled or inarticulate and fragmentary. Clear enunciation and effective expression should be developed as early as possible because wrong habits, once learned, are difficult to unlearn. The responses to questions should be made in well-chosen words that are organized into grammatically correct sentences, worth while and significant.

As a rule it is best not to repeat either questions or answers. The pupil discussing a problem is entitled to close attention, and under normal circumstances there is little justification for repeating questions or answers. In the school shop, or where sudden or unexpected noises might temporarily interfere with hearing, it is naturally appropriate to repeat what was not heard. Where noises interfere regularly with oral discussion, such discussion should be reduced to a minimum. Written questions—either on the blackboard or on paper—and written responses can be used to advantage in some instances.

It is not good practice to exploit a few who are always ready to respond, at the expense of others who do not volunteer to answer questions as readily. The aim should be to develop each individual as fully as possible in the time that is available. In order that this may be done systematically, some plan of satisfactorily distributing questions should be followed. The less obvious the plan, the better it is likely to work; the more mechanical the procedure, the more obvious it becomes.

There is a type of question, sometimes called the *suggestive question*, which does not call for an original response involving careful thinking. It is sometimes used in order to save time or when the teacher wants the pupils to answer a certain way. The story is told of an attractive young girl who was teaching her first term in a one-teacher country school. One day the county superintendent of schools stopped at her school. As he stepped into her classroom she said: "How do you do, Mr. Smith? Children, this is Mr. Smith, our county superintendent of schools.

Let us say good morning to Mr. Smith." The children gave him a loud "good morning, Mr. Smith." She then said, "We are very glad to see our superintendent, are we not?" A lusty response in the affirmative followed. The young teacher was sincere in what she said and her expression and tone of voice, together with the way she said the words, brought the unified response that was given. After a time, when the superintendent had the opportunity to speak to her privately, he said, "Young lady, do you realize that, when you ask a question in that way (the suggestive question) and say it in that animated manner, your pupils will always say 'yes' no matter what you may say?" She did not think so. She felt sure the pupils meant every word they said. The superintendent then asked her if she would be willing to say to her pupils, just before the superintendent was to leave the room, "Children, we like Mr. Smith. We would all be glad to see him hanged, would we not?" She assented, and a strong affirmative chorus was the response to her question. The teacher learned that she must not use a suggestive question when original thinking is needed.

A question that involves two or more distinct, unrelated ideas should be avoided. In popular parlance this is called a *double question*. The following question is of that type: "Describe the characteristics of shellac and varnish and explain why brushing lacquer should not be applied over floor varnish." It would be better to employ two separate questions. One question should ask for a comparison of the chief characteristics of shellac and varnish; and, when that has been covered satisfactorily, the instructor may introduce the quite distinct concept represented by the question, "Explain why brushing lacquer should not be used over floor varnish."

Another "type" of question that should be avoided is the *catch question*. By this is meant a question that is tricky or misleading. Perhaps it is because more than one interpretation may be placed upon it, or the correct answer hinges upon some word or phrase whose meaning is not clear. If the word or words that are not understood were to be learned, the question could not properly be called a "catch" question merely because the individual failed to learn what he should have acquired. If, for

example, a boy in the automobile shop is asked, "What is the function of the manifold?" he cannot properly call it a catch question simply because his knowledge of the word "manifold" is limited to "numerous" and "of great variety." In framing questions orally as well as in writing them the teacher should aim to avoid questions that are misleading.

We are told that the *direct question*—the one that can be answered by "yes" or "no"—should not be used. It would probably be better to say that it should be used sparingly. If such a question is followed by others, there may be certain advantages at times in using the so-called "direct question." Let us take the case of the pupil who is inclined to respond on the basis of snap judgment rather than careful thinking. By asking him a direct question, which he is likely to answer incorrectly, and then by following the matter up with supplemental questions that will force him to *think*, he may be aided in developing the desirable habit of thinking *before* giving a positive reply.

And, finally, do not encourage pupils to answer in the words of the textbook or reference book. Teach them to express their convictions in their own words. Let them extend their vocabularies as much as possible. In their assigned reading they will find new words which may well be used when appropriate and useful, but the phraseology should be the pupil's own.

7. Questioning in individualized instruction. The general principles and techniques that are appropriate for questioning as a method of group instruction will hold, in the main, for the technique as it applies to individualized instruction. It will be recognized, however, that in dealing with a single individual in privacy, as is so often the case in shop and laboratory instruction—privacy that is possible because of shop noises and manual activity—the question can be made more direct, more personal, and more effective than if asked where others would hear what is said. In individual instruction the question can readily be suited to the pupil's particular needs, interests, and capacities. Questions and responses can partake of the nature of a normal, interested discussion between the pupil and his teacher. Such intimate questioning has advantages, but it also has distinct limitations. Individual instruction does not give the same opportunity to learn

through an interchange of ideas with other students that is present in group learning. For that reason, and for other reasons, a well-balanced *curriculum* will provide for both individual and group learning.

8. Questions as means of seeing new implications. It is a commonplace that pupils of high school age do not see the same implications in what is taught as are evident to the experienced



FIG. 20. Another view showing students testing air-conditioning equipment at Dunwoody Institute

teacher. Instead of pointing out the more subtle and complex bearings and relationships in the form of declarative statements, would it not be better teaching practice, at times, to employ appropriate questions instead as a means of mental stimulus and development? In school learning as usually organized there is so much of unrelated uncoordinated learning. L. P. Jacks has well said: "What we have to aim at is not education of the mind alone, nor of the body alone. It is the education of the whole man as an inseparable unity of body and mind."⁸ Good questions can help to make clear the implications of what is learned.

⁸ L. P. Jacks, "To Educate the Whole Man," *Adult Education in Action*, p. 6.

9. Is the oral quiz worth while? Whether or not the oral quiz is worth while depends to a large extent upon how it is used and whether or not it is adapted to the purposes that are to be served. In general, if such a quiz is to be given daily, it should be of short duration—say five minutes in length. Among the advantages that are claimed for the short, daily oral quiz are the following: It aids pupils to develop the habit of thinking quickly and it gives desirable training in oral expression. It also serves as a daily stimulus to study. Another advantage is that it permits a broader sampling of knowledge than would be possible in equal time by other methods. It is high in rapport—pupils often prefer the oral quiz to written examinations, particularly those of the essay type. And finally, it reduces the work for the teacher in that he does not need to mark papers and can devote additional time to instructional responsibilities.

On the other hand, the practice of giving oral quizzes is occasionally abused. Too much time is sometimes taken to check what is learned, as compared with the attention given to diagnostic, constructive, and remedial teaching. Among the disadvantages of this form of learning may be mentioned that it stimulates encyclopedic learning or the memorization of facts. It likewise falls short in that it does not appreciably develop the ability to think—the time allowed for each question is not sufficient to permit this. Another objection is that the teacher's marks, if given, are subjective in nature, and hence relatively low in reliability. Still another element of unfairness is introduced, if such examinations are rated, because the pupils are called upon to answer questions of varying difficulty. And, in conclusion, the oral test lacks the diagnostic value of written tests because the instructor has no evidence as to how well the entire group could answer the questions that were asked.

10. The question and answer method. Some of the earliest forms of technical training for vocational purposes followed the catechetical method, which gets its name from a short religious treatise in the form of questions and answers. This method is still used by prospective miners, plumbers and steam-fitters, firemen, civil service employees, and others in preparing for the examinations that are required to obtain a job or to work up to a

higher one. Looking at this method from a pedagogical viewpoint, we see that it stimulates factual learning at the expense of developing the power to think things through independently. The facts learned may be very essential, but the underlying reasons ought to be known also.

PRACTICAL SUGGESTIONS FOR TEACHING

With the discussion given in this chapter as a background for our thinking, let us attempt to list a few of the most vital points that will be helpful to prospective and relatively inexperienced teachers. These points follow herewith.

1. Questions should be clear, definite, and concise.
2. Questions should stimulate pupil activity. In order to meet this requirement they must be interesting, timely, thought-provoking, and adapted to individual differences.
3. In planning instruction select pivotal or key questions, and supplement them extemporaneously.
4. Among the things that should be avoided are: (a) inarticulate and fragmentary responses; (b) catch questions; (c) double questions; and (d)—with few exceptions—questions and answers that are stated in terms of the textbook and those answered only by "yes" or "no."
5. Prominent among the common faults in questioning are: (1) asking too many questions; (2) not allowing sufficient time for thoughtful responses; (3) failure to recognize and use properly the replies made by pupils; and (4) an inquisitorial manner of asking questions which inhibits free and natural discussion.
6. Well-selected questions are very effective in motivating lesson assignments, in stimulating interest, in leading pupils to see new implications, in extending knowledge, skill, insights, and appreciations.

FOR DISCUSSION

1. Name three or more characteristics of a good question.
2. How may one develop skill in asking questions?
3. Under what conditions should a teacher answer questions asked by pupils? When should he not do so?
4. Suggest how to deal with irrelevant questions.

5. Give an example of a thought-provoking question in contrast to one that does not stimulate reasoning.
6. Show how questions can be used to stimulate: (a) appreciation; (b) skill; and (c) knowledge.
7. Illustrate how questions can be used to motivate a lesson assignment.
8. Indicate how the replies to questions may be handled to advantage by the instructor
9. Describe an effective way of distributing questions among the pupils of a class.
10. Why are questions that provoke thought better pedagogically than those that do not?
11. Illustrate circumstances under which oral questions are probably superior to written ones. Written ones to oral.
12. Give one or more examples illustrating the difference between good and poor use of the direct "yes," "no" type of question
13. Indicate the educational value in questions asking for comparison.
14. Illustrate what is meant by a leading question and indicate its value for instructional purposes
15. Express your belief concerning whether or not teachers are justified in asking questions that cannot be answered at the time
16. On what basis may one justify questions calling for encyclopedic learning?
17. Enumerate six or more purposes for asking questions.
18. Show how the question may be used to bring out what the pupil has difficulty in expressing.
19. What advantages are there in considering the various "types" of questions?
20. Show how questions can be used effectively to correlate and integrate learning.

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CHAPTER X

VISUAL-SENSORY AIDS TO INSTRUCTION

NOT TO REPLACE, BUT TO SUPPLEMENT AND MODERNIZE TEACHING PROCEDURES

1. What is meant by visual-sensory aids. Some years ago the term "visual education" was used to designate instruction in which visual experiences served as the chief means of learning. It was believed by some that as much as 85 per cent of what was learned was acquired through the eyes.¹ More recent investigation has shown this estimate to be too high, and it has come to be recognized that other senses are also important in learning. Furthermore, the term "visual instruction" is likely to be thought of as a distinct form of instruction which should supplant other forms. This is not true. It is better to think of the various visual and sensory forms of instruction as aids to learning. The present tendency appears to be to refer to them as *visual-sensory aids*. The distinguishing characteristics are not based upon subject matter, or even upon the methods that are employed, but upon the relative emphasis that is given in teaching the subject matter.

Visual and sensory aids, then, are designed not to replace or revolutionize but to supplement and modernize other methods of instruction. They provide sensory foundations, with the aid of which instruction can be made more effective than without such assistance. They are vital not only to a few areas of learning but also to every subject or unit of learning.

Since earliest times visual-sensory aids have been employed as instructional techniques. The extant records of ancient civilizations in the valleys of the Nile, Tigris, and Euphrates rivers and elsewhere show how picture language, hieroglyphics, and

¹ Ellsworth C. Dent, *A Handbook of Visual Instruction*, Provo, Utah, Brigham Young University, 1934, p. 1

printing, each in turn, were used as a means of race progress. The history of education reveals that the great teachers of all time have employed visual and sensory aids. During the first century, Christ used such sensory aids as objects and concrete materials, in order that he might be better understood; during the dark ages monks made their writings more interesting through carefully made illustrations and some years later inscribed on parchment and sandstone plans for great cathedrals; during the Renaissance famous artists and craftsmen employed visual aids; in the seventeenth century Comenius used illustrations in teaching; a century later Pestalozzi, the "father of industrial education," employed field trips and used objects in his instruction. In America, William Penn advocated learning through observation and experience; the Moravians were also among the earliest settlers to stress learning through the practical arts. More recently, visual-sensory aids have been employed on a more extensive scale than formerly in instruction from the kindergarten through college, and business, agricultural, and industrial establishments are using such aids in many new and novel ways.

2. The scope of visual-sensory aids. Certain non-mechanical aids, such as pictures, charts, maps, models, objects, and specimens, are found in varying numbers in most schools, no doubt because they are known to be worth while and are relatively inexpensive and easy to obtain. The extent to which the more expensive aids are distributed was revealed through a national visual instruction survey.² The survey report is based upon returns received from 95 per cent of the cities in the United States having a population of 5000 or more. Approximately 17,000,000 persons are enrolled in the public and private schools included in this investigation. It was found that in the 9000 school systems more than 3,400,000 lantern slides are in use; that about 730,000 phonograph records are available, together with 38,000 phonographs; and that in the neighborhood of 25,000 stereopticons of one type or another are employed as aids to instruction. In addition there are about 12,000 radio sets in these schools, and

² National Visual Instruction Survey—Report of Findings. *School and Society*, 41:487-8, October 10, 1936. See, also, William Lewin, "Audio-Visual Materials for the School Room," *The Instructor*, 46 24, 78, February, 1937.

approximately 10,000 motion picture projects. About 750 installations of motion picture projectors with sound accompaniment were reported. Visual and sensory aids are growing in popularity. In at least one state all teachers in the public schools are required to pass successfully a course in visual-sensory aids as a condition for securing a valid teacher's license.

3. **The educational significance of visual-sensory aids.** Visual-sensory aids are important educationally because they stimulate interest in learning. They provide legitimate appeals that motivate learning and give zeal to continuous educational effort. Such aids likewise help to economize time and effort. This is very important in a time when the curriculum is already crowded and when many worthy new activities are being suggested to enrich present offerings.

Psychologically, visual and sensory aids are valuable because we know that sense-participation strengthens memory and helps to overcome forgetting. Oral expression has advantages over silent reading in this respect; note-taking is an aid to recall; manipulative skills are retained longer, as a rule, than factual knowledge acquired through intellectual effort. Furthermore, intellectual activity itself is based upon sense-perception. The old Chinese proverb that a single picture is worth a thousand words is but one expression of many that stress the educational value of such aids. "Learn to do by doing" is another popular slogan that illustrates the value of sensory learning. Self-expression in its various forms is undoubtedly helpful to learning.

Experimental evidence indicates that visual-sensory aids are fundamental to verbal instruction—they help to reduce verbalism or the meaningless use of words or phrases. They contribute to clearness of perception and to accuracy in learning by substituting clear concepts for vague ones. One's thinking must be clear in order that verbal expression may be accurate and understandable.³ Hoban and others have pointed out that verbalism is a major weakness in American schools.⁴ Visual-sensory aids are means that can be employed to teach pupils what words mean

³ Ellsworth C. Dent, *ibid.*, pp. 6-9.

⁴ Commonwealth of Pennsylvania, *A Summary of the Techniques of Visual-Sensory Aids for Teachers in Service and Teachers in Training*, p. 5

and to aid them in critical thinking, which is the basis of the higher forms of learning. Such aids, then, become devices or procedures that help to make learning more meaningful, more interesting, and more effective.

Human experiences are of two principal kinds, real and vicarious. Visual-sensory aids promote learning through actual experiences and, in addition, they permit us to enjoy vicariously or through imagery and the substituted experiences of others vast realms of experience that would otherwise be denied us. Thus the lantern slide, films, and other aids enable us to experience indirectly things that enrich and deepen life and make it more worth while.

4. *Types of visual-sensory aids.* Although it is probable that in most learning the sense of vision plays a somewhat larger part than do other forms of sense-perception, it is well to recognize *the inter-relationships and coordination that rightly exist among the senses.* Indeed, learning is often so complex in nature that not even the experienced psychologist can be certain of the extent to which one or more of the senses are involved. For practical purposes, however, there are advantages in grouping visual sensory aids into groups, such as the following five-point classification which is suggested by a committee that gave this matter serious attention.⁵

A. Aids through the eye—(visual).

- (1) Projectors: Glass slide, film slide, opaque, micro, motion picture, and stereoscope.
- (2) The camera: Kodak, miniature, motion picture.
- (3) The reproducing devices: The hectograph (gelatin), the mimeograph (stencil, hand and rotary), and the multigraph (metal type).
- (4) The blackboard.
- (5) Slide-making apparatus.
- (6) Lenses, microscope, telescope.
- (7) Pictorial materials.
- (8) Representations, maps, diagrams, etc.

B. Aids through the ear—(auditory).

- (1) The phonograph and (2) the radio.

C. Aids through the eye and ear—(visual-auditory).

- (1) Sound motion pictures, (2) radio vision, and (3) television.

D. Aids through activity.

⁵ *Ibid.*, p. 11.

- (1) The school journey or field trip (including the class period trip, the half-day or full-day trip, and the vacation trip).
- (2) The miniature set (student made), the sand-table or table top, and marionettes or puppets.
- (3) The object—specimen—model collection.

E. Miscellaneous: Dramatization, pageantry, booklets, and exhibits.

In the realm of practical arts and vocational education the present writer should wish to include under item *D* the so-called "practical" or manipulative work, which draws largely upon visual-sensory experiences. For instance, the practical work that is done in industrial arts and vocational industrial classes involves many concrete, objective learning situations that are rich in sense-participation.

5. The blackboard as a visual aid. The school blackboard is not only the most universally available medium of visual instruction; it is also one of the most valuable devices for making instruction concrete and understandable. Much evasive and confusing verbalism can be avoided and many vague statements can be made clear by using the blackboard for sketches, outlines, diagrams, directions, and summaries. Individual as well as group work can often be done to advantage on the blackboard. It should be regarded as a medium to be used by both teacher and pupils. For the teacher it is a means of making instruction effective; for the pupil, a means of self-expression and sense-participation.

In certain areas of learning, such as in the fine and the practical arts, blackboard techniques deserve special attention. Ability in pictorial representation and in rendering sketches in a number of forms, such as isometric, orthographic, and cabinet projection, is very helpful in showing through drawing, the universal language, what words cannot adequately portray. Since pupils learn much through imitation, there is reason to feel that the teacher should possess a reasonably well-developed skill in working on the blackboard or its equivalent. It is quite obvious that the blackboard has its limitations as well as its points of value. Work that is to be used for a considerable time, such as the alphabet and numerals in mechanical drawing, can probably be preserved to better advantage on large sheets of suitable paper. Similarly, sketches, drawings, charts, or diagrams that involve much labor

bulletin board for a given time. It is their function to secure interesting exhibit material, to remove out-of-date material, and to arrange the displays attractively.

Some classrooms, laboratories, and shops also have other display space—frequently a panel of cork or similar material about a foot wide, which forms a belt-course immediately above the blackboard. This too can be used effectively. The best effects are not secured by merely filling the space with heterogeneous displays. Special arrangement, harmony, and suitability to purpose should receive attention.

6. **Objects, models, and specimens.** These aids to learning are grouped in this way because they are closely related to one another and because no attempt will be made to draw hair-line distinctions between them. Even casual reflection will reveal that these terms are given special technical connotations that vary with the occupation or type of activity concerned. The term "model" in fine art usually means a person; in industrial arts it usually refers to a scale reproduction of something of an inanimate nature; in ship building and in structural steel work "model makers" are employed to lay out full-size patterns and their work differs from that of "modelers" who design ornaments in clay or other plastics. Sometimes an object, such as a footstool, is used as a "model." But our purpose here is primarily to call attention to the educative value of using objects, specimens, and models. For our purposes we shall think of an *object* as the thing itself, such as a tool, machine, or piece of equipment like a work-bench, cabinet, or table. In contrast with this a *model* will be thought of as a scale reproduction, a miniature sample of the thing itself. Whereas in school most models are miniature reproductions of the actual objects, it is also possible to have large-scale models, as, for example, a slide-rule that is ten or twelve feet long. The term *specimen* will be used, unless otherwise indicated, for a sample or part of something, like small samples of cabinet woods, small pieces of electric cord, conduit, steel, and the like.

Objects, models, and specimens are essential aids to effective and efficient teaching. Good planning consists in anticipating their use and in having them on hand when needed; good method consists in using them appropriately—in selecting each kind of aid

with discrimination and in using it wisely. The interest in objects, models, and specimens is frequently deepened by having pupils make, collect, or bring in objects, models, or specimens. Interesting material of this kind is often available in the homes of pupils, or it can be obtained from their parents as well as directly from industries, places of business, and commercial establishments. Commonly found examples of specimens obtained in this way are samples of various varieties of wood, which may show finished and unfinished surfaces; samples of all sorts of nails, screws, and other fasteners; samples of many kinds of electrical appliances and materials; specimens of insulating materials, of new materials of construction, or of new finishing processes. In the drafting room an ample supply of specimens of tracing papers and cloths and of drawing papers and blue-print and other duplicating papers can be used to advantage together with actual objects that are to be measured and drawn, models that will illustrate processes of construction, cut-away models that will show working parts normally hidden from view, and other objective material, such as examples of working drawings and specifications, prepared commercially, which will illustrate current practice. Much of such material can readily be obtained for the school free of cost; in other instances the material can be borrowed.

Another worth-while form of aid is what is known as a process display—one showing various steps in the manufacture of a given article, such as an auger bit, a hand saw, or a drop forging for an automobile. Sometimes such displays also show the raw materials from which the finished product is made.

Working models, that is models that can be worked or operated, are especially interesting. Commercial museums are featuring this "work it yourself" principle to an increasing extent because of its evident educational value.

7. Pictorial representation. Pictorial representation of various sorts dates back to prehistoric times, but it was not until 1840 that the first sunlight picture of a human face was produced in America by John W. Draper of New York University. In the wealth of pictorial representation that is all about us it is difficult to realize how greatly pictures of all kinds have increased within recent years. The development of printing, the improve-

ment of type, methods of engraving, high-speed presses, and cheap wood-pulp paper have revolutionized the graphic arts.

Commercial advertisers taught us the value of pictures. More recently they have pioneered in the use of color as an added



FIG. 21. A section of a laboratory showing how a versatile instructor at the Pennsylvania State College uses motors with cut-away sections, electric signs, photographs, and samples or specimens to make his instruction interesting.

attraction. Through pictures many things are brought to us that formerly were seen by the few. It is pictures, not words, that sell automobiles, radios, houses, tools, food products, and clothing.

One of the most popular forms of pictorial appeal is the cartoon. By means of it a definite story is told in an interesting way. Since cartoons appeal to young and old alike, and they are effec-

tive in arousing interest and in provoking thought, there is a place for them in school.

The many fine illustrations in periodicals serve as another source of mental stimulation. From the standpoint of giving an appreciative understanding of contemporary life at home and abroad, pictures posted on bulletin boards or used as reference material are known to be valuable aids to learning.

The stereoscope is an inexpensive optical device constructed along scientific lines that makes it possible to give the effect of depth, or the third dimension, to pictures. The photographs or stereographs used in the stereoscope differ from the ordinary photograph, which is taken through a single opening in the camera, in that the stereograph is composed of two photographs of any given view taken simultaneously by a special stereoscopic camera, which has two separate lens openings arranged so that each photographs the object from a slight angle—one from the right, the other from the left. In looking through the stereoscope one gets the impression of seeing a single view that has depth as well as width and height. The view, consequently, is very life-like and real. The stereoscope can be used to advantage as an aid in collateral study or it can be passed around during a class discussion so that each pupil may use it for a half minute or so to supplement other teaching procedures.

In employing the stereoscope the instructor should teach his pupils how to adjust it so as to get the right stereoscopic effect, and pupils also need guidance in studying such pictures. Toward this end the explanatory notes found on the back of the stereographs are helpful. The national census of visual aids shows that stereographs are used much more extensively than many people realize.

Photography and other forms of pictorial representation have contributed much to make visual experiences of a vicarious nature possible. It is now possible to see the big trees of California without going there; we can see cattle ranches without going to "the Rockies far away"; and we can see how sugar cane is harvested without traveling to Cuba, because photography, which speaks a universal language, is at our disposal. As a result of careful study it has been proved: (a) that in developing a composite visual

is reproduced from a cut made for the purpose, whereas Isotype can be used in various combinations, just as ordinary type.

Weber concludes that verbal description aided by diagrammatic representation appears to be more effective than verbal description used alone.⁹ He would let the simpler of the two precede the other in order of presentation. That is, if the diagram or chart is more readily understood than descriptive phrases, start with the diagram; if the diagram is more difficult to visualize than the verbal description, begin with the verbal presentation. The relative effectiveness of various forms of concrete visual aids as compared with verbal instruction depends, as was proved in the University of Chicago study, upon two chief factors: (1) the nature of the instruction that is given and (2) the nature and extent of the pupil's previous experience and understanding of what is being considered.¹⁰

When charts or diagrams are to be kept for some time, some form of "sized" or filled cloth, like unsensitized blue-print cloth which takes ink well and stands erasing excellently is sometimes used. If a chart is wanted on a roller, it can be drawn on a white, ivory, or light buff window shade provided that the size is suitable.

9. Shop sketches and working drawings. In the realm of practical arts and vocational education, graphic representation through free-hand sketches and working drawings is extensively used to convey more accurate ideas than are possible in words. The art of expression through sketching and drawing deserves to be furthered as a phase of school instruction. Creative thinking, originality, and inventiveness are stimulated thereby, and the ability to visualize is developed through sketching and drawing. Many people in adult life are called upon to read or interpret sketches and drawings, and this ability has its avocational as well as vocational values. The ability to use graphic representation of this sort is conducive to creative effort, which is energizing and pleasure-giving. People who work in the creative spirit are happy in their work and constructive in what they do.

Joseph C. Weber, *op. cit.*, p. 107.

¹⁰ Frank K. Freeman, *Visual Education*, Chicago, The University of Chicago Press, 1924, p. 69.

In mastering the elements of sketching and drawing, imitation no doubt has its place as a way of learning. But the emphasis, it would seem, ought to be upon creative expression and originality of design as soon as the fundamental principles of good design are understood. In other words, original design, carried out without a knowledge of sound principles, is essentially wasteful trial and error learning, whereas original effort, put forth after the elementary concepts of what constitutes good proportion, suitable decoration, and appropriateness of material are mastered, will serve to guide creative effort, much as familiarity with what has been done in the past will guide the social worker and the statesman.

To teach isometric projection or mechanical perspective, isometric paper—that is, paper ruled with faint lines running at angles of thirty degrees to the right and also to the left of the horizontal—is often helpful to beginners. Such paper can be obtained either in loose sheets or in pads of convenient size with card-board backs. It serves essentially the same purpose as does coordinate paper (ruled in squares vertically and horizontally) for orthographic projection.

In teaching free-hand sketching a word of caution may be appropriate relative to the pencils that should be used. The 4-H and 6-H pencils commonly employed for mechanical drawing are too hard for free-hand sketching—a softer pencil such as an HB will be found more satisfactory.

10. The educational trip. As a means of extending organized instruction beyond the four walls of the school building, educational trips are sometimes conducted as a part of schoolwork. They go by different names, such as "field trips," "inspection trips," "school journeys," and "educational trips." None of these names is entirely satisfactory. "Field trip" has a rural connotation; "inspection trip" overemphasizes inspection as contrasted with constructive thinking; and the word "journey" is commonly associated with a trip of considerable length. Since the underlying purpose of such trips is to further learning, there appears to be value in designating such trips as "educational trips." If a name has any effect upon one's mental attitude, then there are good reasons for speaking of "educational trips."

It is generally agreed that the maximum educational values from such trips are secured when pupils have a clear-cut notion of what they are expected to observe before they start. The mind-set should be one of learning, of careful observation and thoughtful evaluation. To this end a certain amount of preparation for the educational trip is necessary. If possible, pupils should have fairly good ideas about what they will see, what it is all about, and how it relates to what is being studied in school. As soon after the trip as can be arranged, there should, if possible, be group discussion with the emphasis upon what was learned as a result of the trip. In some instances written reports or themes are appropriate and help to make more permanent the impressions gained through first-hand observation.

11. The camera as a teaching aid. In one of the preceding paragraphs of this chapter the photograph was mentioned as a form of pictorial representation. The camera reproduces with exactness and fidelity the view that is "snapped." It is well named the "candid" camera. There is a fascination in photography that is felt by young and old. Through it ideas, objects, procedures, achievements, and events can be recorded and made available for future use. Photography is a worthy avocational activity as well as a means toward better teaching. Photographs are valuable for purposes of guidance, instruction, and enjoyment. The camera is an excellent tool for recording photographically the many fine projects that pupils make in the school shop—projects that are often taken away soon after they are completed so that one would have difficulty in telling the story of what was actually accomplished were it not for the camera. In taking photographs for educational purposes interest is frequently added by showing pupils with their handiwork—it introduces "scale" and adds a human touch to the pictures.

Photographs are used in industry as well as by teachers for purposes of analysis, as in slow-motion studies and microscopic examinations. When pupils see photographs of shop projects that others of their age have carried out successfully, they feel more certain that they too can do similar work.

For photographing shop projects and scenes involving adverse lighting conditions it is desirable to have a good view camera

with a ground-glass for accurate focusing; if fast action is desired, a high-grade lens and fast shutter are imperative. A camera has recently been developed that takes photographs at an exposure of $1/100,000$ of a second. One-twenty-fifth of a second will "stop" ordinary human action. The so-called *miniature cameras*, such as the *Leica*, the original miniature camera, the *Kodak Duo Six-20*, or the *Argus*, are popular because of their compactness and suitability for the action pictures one often wishes to take when on trips, as well as for other purposes. For athletic events, for newspaper work, and wherever fast action and quick "finding" are involved, many professional photographers and advanced amateurs like a camera of the *Graflex* type, in which the image can be seen right side up, just to the instant of snapping the picture. The well-known *Kodaks* are designed for a variety of purposes. The versatility of a camera is determined largely by its optical equipment. A "fast" lens combined with a speedy shutter makes it possible to take many scenes under distinctly adverse light conditions.

12. The lantern slide. A mechanism or device which throws an enlarged image upon a screen so that it can be viewed to advantage by a few persons or by many simultaneously is called a "projection apparatus," or simply a "projector." The device that is used for projecting "slides" is known as a stereopticon or stereopticon lantern. It is the modern form of the "magic lantern" of a century or more ago.

A glass slide is made up of a piece of sensitized glass—that is, a glass plate with the same kind of photographic emulsion as is given photographically sensitized paper, such as that used in making photographic prints. In this case the picture is printed on glass. The sensitized surface is protected with another piece of plain glass, a mat is used to give it a border, and paper tape is employed to hold the two pieces of glass together. The photograph may be plain or colored. The coloring may be done by hand or through color photography.

In addition to the photographic glass slide, other forms of glass slides are used. One method is to use plain etched-glass—that which has been specially prepared for the purpose is best—and write or draw upon the glass with an ordinary pencil or

(1) The mental attitude toward the motion picture should be a whole-hearted desire to secure through it a broader, deeper, and clearer understanding of what is portrayed as it relates to what is to be learned and finer appreciations of life experiences that are brought out through motion pictures. To these ends it is often helpful to discuss the motion picture before it is shown—to point out, in more or less detail, what to look for, what questions may be answered, what suggestions may be made, and what implications may be drawn.

(2) In order to stimulate learning a number of concise, pertinent questions are given to the group before the picture is shown. These questions are phrased so that they will bring out the inter-relationships between what has already been taught and what is to be learned through the picture. They are to be answered and perhaps used as a basis for discussion after the picture has been shown.

(3) In some instances, as for example, where the picture shows the petroleum industry, the various stages of manufacture from crude oil as it comes from the well to the finished commercial products, it is helpful to use diagrams, charts, and other forms of illustrations that will give the learner a better apperceptive basis for getting the maximum value out of the motion picture that is to follow.

(4) In studying certain units of learning, such as the development of power machinery and the so-called "factory method" of production, a skeleton outline is frequently used to advantage. Such an outline may be expanded to some extent on the basis of reading and discussion before the film is shown, and it may be developed still further after the film has been presented. It helps to integrate learning.

(5) When a motion picture is shown as a means of vocational insight or guidance, the instructor may ask the pupils to report upon the job requirements, general working conditions, types of equipment used, and other significant factors that relate to such topics as are commonly covered in studying specific occupations or in learning about modern industries in a broader and more general way. The following skeleton outline illustrates the type

of pupil aid that is sometimes used to stimulate reports on occupational conditions as revealed by the motion picture:

TABLE VIII

OUTLINE FOR STUDYING AND REPORTING UPON VOCATIONS

1. *Historical*—Give a brief over-view showing origin and development of the occupation.
2. *Importance*—Show the need for, and importance of, the vocation—such as its economic, social, or political value. Value to community, state, or nation.
3. *Nature of Occupation*—Portray what the worker does. Be definite. Make description inclusive without being wearisome.
4. *Where Work is Done*—Describe the place in clear terms. Indoors or outdoors; city or country; factory, office, etc.
5. *Working Conditions*—

Hours per day and week	}	Pay or other rewards
Steady or seasonal		
Safe or hazardous		
Healthy or unhealthy		
Personal relations		
6. *Advancement*—Opportunities for growth and promotion. Usual lines of promotion—chart same.
7. *Training Required*—Amount

Where obtainable
Approximate cost
Time required
8. *Definite Advantages*
9. *Specific Disadvantages*
10. *Personal Suitability*—An analysis of the occupation from the standpoint of how well you are able to meet its requirements, and an evaluation of how happy and successful you are likely to be in it.

(6) Another aid to interpreting motion pictures is to ask for an oral or written discussion presented in proper sequence, or the order in which the activity took place. Twogood and Cramlet have developed films designed to aid pupils taking mechanical drawing and beginning woodwork.¹² In these pictures each essential step is shown with suitable captions so that the action is intelligible. Pupils may be told in advance that they should look for the successive steps and that they will be asked to describe them accurately.

Teachers will appreciate that the right order is quite as important at times as familiarity with the various operations or steps. Newkirk and Stoddard, among others, have suggested new-

¹² A. P. Twogood, and Ross Cramlet, "Film Slides in Teaching Mechanical Drawing to Beginners," *Industrial Education Magazine*, 31:254-5, January, 1930. See also *Industrial Education Magazine*, 33:308, June, 1937.

type tests in which this same principle is brought out—namely, pupils are asked to indicate the correct production order in which a given project is made.¹³

16. The silent motion picture. The motion picture is in reality an optical illusion produced by projecting a series of still pic-



FIG. 22. Sheetmetal shop, Altoona, Pennsylvania, showing how a display of projects is used to motivate learning.

tures in such rapid succession that action appears to take place. Without doubt the motion picture has come to assume a large place in modern life. It has been estimated that in the United States approximately 100,000,000 persons view commercial movies each week. The motion picture has come to stay. That the average commercial movie has harmful effects upon children has been proved beyond a reasonable doubt.¹⁴ As a result of several years of careful research, covering 6650 child nights of sleep, it was found that on the average children seeing movies showed about

¹³ Louis V. Newkirk, and George D. Stoddard, *The General Shop*, pp. 154-5.

¹⁴ Henry James Forman, *Our Movie-Made Children*, New York, The Macmillan Co., 1933.

26 per cent more mobility during sleep than their normal movements in sleep. But, on the other hand, it cannot be denied that movies are one of the outstanding achievements of the twentieth century and they have won an important place in our lives. Our aim should be to discard the poor movies and to use the good ones. When good movies, having distinct educational value, are produced, the schools stand ready to use them and to give publicity to high-grade commercial motion pictures.

In some respects the silent motion picture is better suited to school use than the motion picture with sound accompaniment. The silent film enables the instructor to adapt his explanatory remarks to the lesson and to the requirements of the learners. This is often advisable because the age, previous experience, and capacity of pupils are known to vary greatly. This remark should not be interpreted as one designed to favor the silent film over the sound film, for it has been shown rather conclusively that each of the commonly employed forms of visual-sensory aids has distinct advantages and that there are conditions or circumstances under which each is best.¹⁵

17. The sound film. The popularity of sound accompaniment to motion pictures is well known. So far the schools have been relatively slow in introducing this modern feature. This tardiness may be due in part to the reputed conservatism of educators toward new educational devices, but it is more probable that the chief obstacle has been financial. The cost of high-grade projectors with sound equipment is considerably higher than without that feature.

Whether the sound accompaniment is valuable or not, educationally, depends upon the nature of the film and of the voice or sound content. If the film represents something with which the teacher is not well informed, and if the sound or voice accompaniment is such that it brings the comments of the expert to aid what the eye can see, then the sound film is at its best. If the sound is merely for purposes of entertainment—as when music is played while a technical motion picture is being shown—the sound feature may be of doubtful value. Thus it is seen that the movie with sound accompaniment, when properly selected,

¹⁵ Frank N. Freeman, *Visual Education*, *op. cit.*, p. 77.

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¹⁶ Frank N. Freeman, *Visual Education*, *op. cit.*, p. 77.

represents a charming, stimulating, and highly educative teaching device. And, conversely, if poorly selected it may be a waste of money.

Motion pictures, both silent and sound, are most worth while when they are given over to those aspects of learning that is their special province—that is, to showing motion or action, to facilitating analysis, to giving insight into what cannot be brought into the school, and to coordinating, correlating, and integrating learning by providing through visual-sensory aids the connecting links that round out instruction. Motion pictures are not so helpful when they attempt to teach what can be taught through actual experience or through demonstrations.¹⁶

The motion picture industry as a commercial venture began with the opening of the first peep show in New York in 1894. In 1905 the first nickelodeon was open. In a single generation the motion picture has a world audience in the neighborhood of 250,000,000 people.¹⁷

18. The radio as a teaching aid. The period of time, from the first demonstration of electromagnetic waves by Herz in 1887 and the first practical radio communication by Marconi in 1896 to the present day, is a very short one as measured in years. But when evaluated in terms of radio achievement the results are epoch-making. As late as 1912 there were doubts as to whether or not the radio would be able to render a service comparable to that of the telephone and telegraph. That question has been definitely settled. Radio has become so important to our national welfare that the United States Government considered it essential, in 1917, to take over control of radio communication,¹⁸ and in 1927 a Federal Radio Commission was appointed to regulate broadcasting. In 1920 the government gave up to the Radio Corporation of America the control of the stations which it had taken over upon the declaration of war.

It is difficult to estimate the educational value of the radio in exact terms, but it is generally recognized as an educational medium that reaches millions of interested listeners and which

¹⁶ Frank N. Freeman, *ibid.*, pp. 69-80.

¹⁷ John Glover, and William B. Cornell, *The Development of American Industries*, pp. 745-61.

¹⁸ *Ibid.*, pp. 763-800.

has far-reaching effects. More and more schools are being equipped with radio connections for each room or at least for each "home-room" so that pupils may listen to important broadcasts without having to go to the central auditorium. The radio is also used for local programs and for announcements. Courses of instruction are given "over the air" by colleges and other educational agencies. A study made by Tyler in 1933 showed that twenty-four land-grant colleges and state universities were operating broadcasting stations, and thirty-eight were making regular or occasional use of commercial stations.¹⁹ Persons especially interested in radio as an aid to instruction should write to the National Committee on Education by Radio, 1201 Sixteenth Street, Northwest, Washington, D. C., for free copies of its weekly bulletin.

19. The school exhibit. Two kinds of school exhibits are meeting with wide favor. The first is the exhibit of work or products made by pupils. These are always interesting to young and old, to pupils and parents, and they have distinct educational values. They arouse desirable competition, they stimulate achievement, and they teach the value of painstaking effort. The second kind of a school exhibit is the activity type. Parents and other persons interested are invited to visit school—usually during evening hours—when classes will be in operation. Regular schoolwork will be in progress and thus the "exhibit" or "open-house" occasion enables parents and patrons to see the pupils in action under circumstances closely resembling those obtaining under normal instructional conditions.

Exhibits having instructional value should be used continuously. The average school shop and classroom deserve to be planned so that exhibits are always at hand. Built-in cabinets or exhibition space can often be provided in wall space that is not otherwise used. The best time to plan this is before the building is erected, as at that time the additional expense is negligible. The inside of closet doors can sometimes be used, if the door has a glass panel, by fastening several shelves to the door and covering the back with a cloth of suitable color, which will form the

¹⁹Tracy F. Tyler, *An Appraisal of Radio Broadcasting in the Land-Grant Colleges and Universities*, Washington, D. C., National Committee on Education by Radio, 1933.

back of the cabinet. This device is inexpensive and makes the display cabinet readily accessible.

Pupils should be taught to regard it as an honor to have their work exhibited and a privilege to contribute toward the permanent displays that the school may need.

20. **The demonstration.** Within its proper realm—which means within the range that school conditions permit—the teacher-demonstration is a distinctly effective way of using visual-sensory aids. Studies that have been made to determine the relative effectiveness of the teacher-demonstration as compared with verbal instruction and with slides and films indicate that, where the demonstration is such that the teacher has the materials, tools, and knowledge and skill required, it is more effective than the other devices mentioned. Freeman says: "In teaching science, demonstration by the teacher is superior to the motion picture" and, again, "It is uneconomical to put into motion pictures action which can readily be demonstrated by the teacher."²⁰ A well-conducted demonstration is one in which every step is clearly understood and shown in a manner illustrating the best procedure, and where sufficient time is given for reflective thought and critical thinking. The demonstration is probably most effective when followed by pupil participation. Some experiments have been carried on that appear to indicate that careful demonstration in the science laboratory results in a higher score in immediate retention than the experimental work done by pupils.²¹ On the basis of the studies quoted by Mueller it would appear that carefully conducted demonstrations may be used to advantage more frequently in the laboratory than is now the usual practice. Further investigation is needed to determine to what extent this may hold for shop demonstrations in industrial arts and in vocational instruction. Another form of demonstration having educational possibilities is dramatization. Children, as a rule, enter into such activities whole-heartedly. Many worthwhile causes, such as safety, fire prevention, courtesy, and first-aid, have been furthered through dramatization.

21. **A comparison of methods of instruction.** Among the con-

²⁰ Frank N. Freeman, *op. cit.*, pp. 69-80.

²¹ A. D. Mueller, *Teaching in Secondary Schools*, pp. 233-37.

clusions reached in the comparative study of motion pictures and other methods of instruction that was made under the Commonwealth Fund some years ago, are the following deductions.²²

1. In teaching how to make something, demonstration, where it can be carried out to advantage, is superior to the film; but, otherwise, the film was found to be superior to the other methods to which it was compared.
2. Motion pictures do not appear to have unparalleled value for purposes of motivation.
3. The special value of the film lies in its ability to furnish a teaching content that is difficult to provide in other ways.
4. The studies indicate that a good teacher is more effective than material devices.
5. When motion pictures are shown teachers should encourage a mental attitude of intellectual alertness rather than be satisfied with one of passive receptivity.

PRACTICAL SUGGESTIONS FOR TEACHING

The following suggestions concerning visual-sensory aids may be helpful to those who are seeking to master the techniques of objective teaching.

1. In many respects the classroom or related subjects room, rather than the school auditorium or large visual-sensory aid room, is the ideal place to show slides or motion pictures because it gives the right atmosphere for learning.

2. Films can be shown with a suitable projector in the ordinary class or related subjects room or school shop in a satisfactory way provided that the shades are drawn and direct sunlight does not fall upon the windows.

3. If a standard screen is not available, a white wall, an ordinary bed-sheet, or the white back of a wall-map will serve the purpose.

4. Visual-sensory devices are most effective when they are correlated with the daily units of work and when pupils are held responsible for the results.

5. For many purposes the silent film is as helpful as the sound film, and still pictures as good as motion pictures.

6. The temptation to show too many pictures at one time

²² Frank N. Freeman, *op. cit.*, pp. 60-80.

should be avoided; it is better to use a few good ones than to employ many of unequal value.

7. Full discussion before and after slides and films are used is greatly to be desired.

8. In order that the teacher may be well prepared, slides and films should be pre-viewed.



FIG. 23. A group of industrial teachers inspecting one of the well-lighted and well-equipped shops of one of the Harrisburg, Pennsylvania, high schools. Well-planned educational trips are easily worth the time they take.

9. In selecting pictures, slides, or films select those that have inherent quality to bring out effectively what is to be taught, especially what is inaccessible in other forms of instruction.

10. Color greatly enhances the value of most pictures. It adds life and reality, which, in turn, increase interest and understanding.

11. Visual-sensory aids are most helpful when used as a tool or as a book with definite goals and with seriousness of purpose—mere “exposure” is insufficient.

12. Stress ability to analyze, proficiency to summarize, and capacity to generalize what is taught through, or with the aid of, concrete experiences and visual-sensory aids.

FOR DISCUSSION

1. Why use the term "visual-sensory aids" rather than "visual education" for the broad, inclusive, generic term?
2. What is a miniature camera; a view camera; a panoramic camera; a motion picture camera?
3. Name one or more magazines that are devoted largely or exclusively to visual-sensory instruction; to photography; to motion pictures.
4. Name two or more well-known Americans who contributed significantly to the development of motion pictures; to the perfection of the radio.
5. What is meant by verbalism? Give an example.
6. To what extent is it feasible to conduct educational trips for classes in your area?
7. What specific provisions have you to suggest for making educational trips effective?
8. Name the principal types of slides that are used in schools and explain the chief advantages and limitations of each.
9. Make suggestions concerning the proper use and care of blackboards.
10. Indicate what types of objects, models, and specimens would be most helpful in your area of special interest and state how they may be housed or exhibited to best advantage.
11. Describe a practical way of taking care of shop sketches and working drawings.
12. Make specific suggestions for conducting an exhibit of projects made in the school shop; for exhibiting drawings.
13. Compare the stereoscopic picture with the flat picture.
14. How may a stereoscope be used to effect in your field of major interest?
15. Explain for what purposes or in what respects sound films are superior to silent films.
16. Is teaching through concrete or objective means always superior to verbal instruction? Explain.
17. Which is more important, abundant equipment for visual-sensory instruction or high-grade teaching? Why?
18. Why is hand re-winding of shown films advocated?
19. What is the disadvantage of attempting to project pictures on too large a scale?
20. Why should the projection door be kept closed when the machine is being operated?
21. How may breakage of glass slides be reduced to a minimum?
22. What is wrong if motion pictures look as if rain had struck the scene?

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CHAPTER XI

DISCUSSION METHODS

THE SYMPOSIUM, OPEN FORUM, ROUND-TABLE, CONFERENCE, AND PANEL PROCEDURES

1. The lecture method. There are good reasons for believing that discussion was employed by primitive man as much as a million years ago. It is likewise probable that the vocabulary at the command of paleolithic man was in scope and quality far from that now possessed by the average elementary school pupil. From prehistoric, through ancient, medieval, and modern times, race progress can be measured by increases in vocabulary, by greater freedom of speech on the part of the masses, and by a certain essential considerateness and restraint in oral expression which show mastery of thought and self-control.

In this chapter it will be our purpose to indicate something of the origin, development, and value for educational purposes of the more commonly used forms of discussion. Let us first consider the well-known lecture method. By a lecture is meant a more or less extended oral presentation of knowledge which has its maximum value with adults. It has probably always been one of the leading, if not the foremost, methods used in systematic, organized instruction for adults. Even to this day the lecture method, including a number of variations of it, continues to be used extensively in education given on the college level. In secondary schools this method is less appropriate, and in the elementary school there is scarcely a place for it.

Among the chief disadvantages of the lecture method are the three following ones: (1) It puts the chief emphasis upon teacher rather than upon pupil activity; it demands receptivity rather than creative activity on the part of the learner. (2) Learning is relatively ineffective because it does not call for visual, sensory, or motor expression—not even to the extent of oral discussion.

(3) The instructor cannot be sure that he is fully understood as he proceeds, nor can he be certain that his hearers are concentrating on what he is saying.

For purposes of adult education the lecture method was used in the United States as early as 1889. At that time free public discussions were scheduled in New York. A few years earlier the American Museum of Natural History, in the same city, sponsored free public lectures of an educational nature for teachers.¹

In spite of the well-known weaknesses in the lecture method of teaching, it must be admitted that it has a place in junior and senior high school education. For example, in industrial arts and in trade education there are times when the instructor can well amplify orally the information that is available from other sources. If the lecture is restricted to short periods of from five to fifteen minutes, and especially if it is supplemented by demonstrations, illustrations, or other appropriate procedures, there can be little question of its suitability as *one* method among many, all of which have their place.

2. The symposium. The symposium is of Greek origin. In the days of Pericles it was a "feast of reason" following the banquet. The derivation of the word implies conviviality, but this is no longer associated with it. We think of a *symposium* as a *group of comments, either spoken or written, which portray contrasting, or at least different, points of view*. The chief purpose of the symposium is to clarify thought upon controversial questions. As a rule the general audience listens to the discussions and each person forms his own conclusions concerning the validity or value of the points of view presented. Many debatable topics in education may be discussed to advantage by this method. Among such topics are: goals, course of study content, guidance, methods of teaching, supervision of instruction, pupil government, and the like. One may reasonably expect that the symposium will stimulate breadth of understanding and that it will help to develop a much-needed attitude of tolerance and open-mindedness toward view-points differing from those an individual holds.

¹ Paul Monroe, *Encyclopedia of Education*, New York, The Macmillan Co., 1913. Vol. 3, pp. 671-2.

Symposium procedure can be illustrated through several articles that have appeared in the *Journal of Adult Education*.²

3. The open forum. The forum was of Roman origin. "Forum," a Latin word meaning "market place," is related to "foris," out of doors. In the days of the Caesars the forums were places for general public assembly for worship, political rally, business, or amusement. The Eternal City had many of these, the chief one being the Forum Magnum, or Forum Romanum, which, Hamlin says, "was at first merely an irregular vacant space, about and in which, as the focus of civic life, temples, halls, colonnades, and statues gradually accumulated."³ This famous forum, in which the early tribes gathered to speak their convictions, covered an area of 3500 square yards and included, in addition to the main area which was entered through the triumphal Arch of Trajan, the Ulpian Basilica, the Temple of Trajan, and his huge Doric Column of Victory.

In the United States, and elsewhere, the open forum is gaining in favor as an educational device that is especially well suited to stimulate thinking and lengthen the time spent in study and cooperative effort. The United States Office of Education has issued a concise and very helpful bulletin describing public affairs forums.⁴ *The open forum stresses the free exchange and free sharing of view-points and beliefs.* At heart the purpose of the open forum is not to "sell" pre-conceived plans or programs, but to make a self-repairing and self-evolving, democratically conceived social order possible. The open forum seeks to clarify thought and to teach habits of group thinking. The potentialities of open public forums may be judged from the fact that there are in the neighborhood of 75,000,000 adults in the United States. To utilize this tremendous power more effectively is the challenge that we face. The United States Office of Education reports that of this number not more than 1,000,000 now attend any kind of forum or open discussion group on public affairs. It is evident,

²"Creative Expression. A Symposium," *Journal of Adult Education*, 7 179-87; and "Worker's Education: A Symposium," Vol. VI, Part Two, October, 1934

³A. D. F. Hamlin, *History of Architecture*, New York, Longmans, Green and Co., 1907, pp. 97-8

⁴J. W. Studabaker, and C. S. Williams, *Education for Democracy*, Bulletin 17, 1935

of course, that men and women in industry and teachers of practical arts and of vocational education should be as active as others in studying current social and economic problems. It has furthermore been demonstrated that certain discussion procedures, such as the open forum technique, can be used to advantage in secondary schools when controversial or deep and far-reaching problems are up for consideration. One way to get adults interested in such educational procedures is to teach pupils how to use them. There are plenty of vital problems that come within the proper scope of industrial education which can be handled by the open forum method.

4. Agencies sponsoring forums. Forums vary considerably in sponsorship and in management. There is a loose federation known as the *Open Forum National Council* which was started in 1904 by George W. Coleman of Ford Hall Forum, Boston. Ford Hall Forum was financed for some years by Daniel S. Ford, owner of the magazine, *The Youths' Companion*, now called the *American Boy*. This association conducted courses on forum management and has helped to stimulate the growth of successful forums in a number of states. The Open Forum National Council describes the forum as follows: "The forum avoids partisanship, eliminates sectarianism, and disowns class distinctions. The forum is not a deliberate assembly. It is not a debate, nor a concert, nor an entertainment, though it has in turn all the allurements, intensity, contention, delight, and excitement that characterize these widely varied occasions."⁵ The types of sponsorship mentioned by Studebaker and Williams include:

(1) *Citizens' committees*. The committee of citizens which sponsors the forum may be selected because they are representative, active individuals who can be counted upon to accomplish what is desired. Such a committee sometimes cooperates with school, church, or other organizations with which they have interests in common.

(2) *Civic or educational organizations*. This type of sponsorship can be illustrated by health, medical, bar, and municipal

⁵ American Association for Adult Education, *Handbook of Adult Education*, p. 63.

associations that interest themselves in furthering a worthy cause through forum discussions.

(3) *Religious and social welfare groups.* In this classification may be placed churches, Y. M. C. A., Y. W. C. A., Y. M. H. A., and similar associations that conduct forums on problems of current interest, such as marriage, divorce, child labor, and pure foods.

(4) *Individual or private organizations.* A forum is sometimes started by an individual, who usually seeks the cooperation of representative leaders of similar interests. Occasionally such a forum is conducted for profit; more often the individual is on a salary.

(5) *Libraries.* Some libraries sponsor forums either directly or they make their facilities available to appropriate community organizations.

(6) *Schools or universities.* Public school systems, such as those of Des Moines and Philadelphia, and collegiate institutions are among the agencies that sponsor open public forums dealing with a wide range of topics. Where sponsored by a foundation, such as the Carnegie Foundation working through the public schools, attendance is free, as at Des Moines, or fees may be charged as is done in other cities. When college credit is involved it is customary to charge the usual rates in effect at the collegiate institution that sponsors the forum. Those attending as auditors who do not desire college credit are sometimes charged a somewhat lower rate.

(7) *Political and propaganda groups.* Forums are also conducted by groups whose chief objective is to promote or further a particular point of view, doctrine, or plan. Such forums are in reality not "open" ones, in the sense that, although opposing view-points may be expressed, they are likely to be used for purposes of unfavorable comparison. The facilities of the public schools should not be used for purposes of propaganda, if by propaganda is meant the furtherance of a *partisan* cause. To further matters of general public welfare, such as the elimination of venereal disease or the promotion of the American Red Cross, is not so classified.

5. Principles underlying forum management. If the open forum is to serve as a clearinghouse for ideas, then, let us repeat, impartiality must prevail. To be sure, controversial questions may be discussed—in fact should be encouraged—but they must be handled in such a way that light rather than heat is generated in the process. To this end the chairmanship is very important. On the basis of experience it may be said that it is desirable to have a chairman who has proved leadership ability and who has had experience in handling public meetings. In the larger forum meetings, particularly, the chairman must be able to sense what is most appropriate at any given moment. There are times when plans must be modified and when tact, diplomacy, and courage will be needed.

In conducting such meetings it is wise to select topics that are of vital interest, and they should be discussed in such a way that the general audience will understand what is said. To this end the chairman must see to it that the speakers are heard and, likewise, that individuals in the audience speak loudly enough to be understood.

Wherever possible the general audience should participate in planning the meetings. The forum should truly be a cooperative affair.

The open forum is intended to stimulate further study and original investigation. In order to facilitate this, forum management will utilize such devices as these: (1) References for further study may be mimeographed for distribution to those who desire them. These will include references to books and to periodical literature. (2) Reading circles have been organized in some centers. The forum meetings may be based upon what has been read. (3) Small study or discussion groups have proved of value as devices to supplement the forums. (4) Visual and sensory aids of various sorts have likewise been helpful in motivating further study, and selected book displays dealing with topics of current interest are distinctly worth while.

It has been found to be desirable to use cooperating agencies wherever possible. Among those that have not been mentioned are newspapers and the radio.

The maximum participation in forums on the part of adults is

secured through local, neighborhood forums. In Des Moines each one of such forums was attended by groups of from 25 to 50 people. The forum leaders were trained. There is also a place for the larger community or regional forums, but the neighborhood forums probably provide the greatest opportunity for self-development for the many, while central forums serve a similar purpose for a smaller group of representative adults. Experience with neighborhood forums in Des Moines and elsewhere shows that older people of quite ordinary schooling cooperate in a very gratifying manner and develop ability to think creatively, to express themselves clearly, and to work effectively toward desired community goals.

6. Managing an open forum. In Des Moines the neighborhood forums were usually held from 7:45 to 9:15 P.M., and the larger, city-wide meetings were scheduled for a half hour longer. As a rule the first fifteen minutes were devoted to items of interest which related the new meeting to the previous one. The next forty-five minutes were used in presenting the subject for the evening's discussion, and the last half hour was reserved for general discussion.* In order that there may be no misunderstanding, the time to be allowed those who participate should be clearly understood and the chairman should adhere to the schedule.

If the group is large it may be advisable to use a microphone for asking questions from the floor so that the audience will hear the question as well as the answer. It can be placed in the central part of the room where it can be reached with relative ease. Another plan is to hand written questions to the ushers, who will carry them to the platform where they will be announced. The time allowed for comments and questions from the floor may have to be restricted to a few minutes for each person.

The chairman must show good judgment in dealing with "cranks" and those who waste the time of the group. It is not wise to disregard them, but, if the general audience understands that each person is to be limited to a few minutes and will cooperate with the chair, such individuals should not prove hard to handle.

After the period devoted to general discussion, five or ten

* Studebaker and Williams, *op. cit.*, pp. 20-1; 52-6.

minutes may be used by the speaker or the chairman to summarize the discussion.

7. **The forum technique in school.** Although the forum procedure is especially well adapted to adults, it is also of value for pupils of high school age. And whereas the plan has been used most extensively in secondary schools with classes in social studies, is it not reasonable to believe that the forum technique can be used equally effectively to clarify perplexing problems in industrial education? We profess to believe that education is life as well as *preparation* for life. If that is true, and if the forum procedure is as worth while as it is thought to be, then we should see to it that young people understand the objectives of forums and that they get actual experience with them while in school. Among the problems that industrial arts and vocational industrial pupils may find worth tackling through forum procedure are such as these: employment conditions; labor problems; occupational studies; the craft unions; employers' associations; ethics in industry; safety; first-aid; workmen's compensation; industrial poisons; the place of part-time education; evening classes; slack-season instruction; labor-saving machinery; new materials of industry.

8. **The round-table discussion.** This familiar method of discussion is said to have an ancestry dating back to King Arthur of the Britons (sixth century), who feasted his knights around a "round table," thus avoiding all questions of precedence. This democratic and informal way of gathering for purposes of discussion is admirably suited to small groups. Without attempting to lay down hard and fast rules, it may be suggested that when round-table discussion groups are kept relatively small, say not exceeding fifteen or twenty-five individuals, better results are probable than with larger groups. By keeping the number small there is better opportunity to get relatively frequent participation from all individuals represented. In some instances it is feasible to permit additional auditors to be present. In general, unless called upon, they do not participate in the discussion.

In recent years the round-table technique has been employed extensively in foreman training and in instructing firemen, custodians, peace officers, and others. It has likewise been widely

used in *conference-leader* education, or in instructing those, who in turn, will teach foremen, journeymen, apprentices, or helpers.

In round-table discussion the key-note is informality and freedom of discussion. Prepared addresses are out of order in round-table procedure.

9. The conference procedure. As was indicated, the so-called *conference method* is a discussion procedure that represents essentially "round-table" technique. In the United States this method has been popularized by the professional staff of the Federal Board for Vocational Education, now affiliated with the United States Office of Education. Various state departments of education, local units of education, and business and industrial establishments have likewise used this plan extensively with adults.

The conference method presents a strange paradox, for, although it is used rather extensively with adults, it is frequently misused; although it is of ancient origin, it is still not well understood by many who use it. Socrates used this method effectively more than twenty-five hundred years ago, and today demonstrations or sample conferences are being conducted by persons who are showing others how to use essentially the same procedure. At heart the procedure is designed to *draw out, to evaluate, and to integrate* the experiences of a group of adults. In this process the leader adroitly elicits responses; he cleverly suggests cases, problems, or situations for discussion; and he is instrumental in harmonizing, correlating, and unifying knowledge and experience. But the conference method is more than a drawing-out procedure for, through this, constructive thinking is stimulated. So the conference technique is fundamentally an educational one. Its soundness rests in part upon the facts that the subject matter is vital and within the range of interest and of ability of those who compose the conference group.

In principle, the conference method reverses the lecture method in that the chairman or leader aims to "draw out" of those present what *they* know instead of telling them what *he* knows.

The conference leader becomes, essentially, a traffic officer of ideas. It is believed that the pooled judgment of a group of persons is likely to be better than that of any single member of the group. Through the conference method various different view-

points are brought out which help to clarify thinking. The procedure can be discussed under the following eight heads.

(1) *Selecting the conference leader.* Leaders may be selected from two sources: (1) from within an industrial or business organization and (2) from the outside. There are advantages as well as disadvantages in both plans. If intimate company problems are to be discussed, it may be best to use a leader from



FIG. 24. A group of more than 1000 adults attended this city-wide forum at the East High School, Des Moines, Iowa. Notice the typical panel arrangement on the platform. The speaker is Fred Henderson, British socialist, economist, and author.

within the organization who is thoroughly familiar with the situations. But if that is not the case, an "outside" man may be best because he does not know the members of the conference personally. This is often an advantage. It permits him to discuss such topics as cooperation, safety, and efficiency without fear of having his questions, cases, or illustrations regarded as personal thrusts.

Like leaders of the discussion groups, the conference leader must be tactful. He should be able to adapt his methods to changing circumstances and, above all, he must "play the game" squarely. His job is to be constructively helpful. He is not there to act as an informer to the management that employs him. His

job is to demonstrate a technique; to guide others to solve their own problems; to be of help in a plan of self-education through group thinking.

(2) *The physical setting.* The place and the physical conditions under which the conference meetings are held are more important than may be supposed. Adults who have been out of school for many years often feel out-of-place in a typical school setting. And since it is very necessary to have everyone feel at ease, it has been found desirable to hold such meetings in places other than schools. Foremen's club rooms and conference rooms in industrial establishments are suitable. A table or two, so arranged that all can see and hear each other easily, and comfortable chairs are necessary—most foremen are active individuals who find it difficult to sit still for a period of an hour or two. A black-board or its equivalent in the form of large sheets of paper will be needed during the conference. Each individual should also be encouraged to keep such supplementary notes as he wishes, but lengthy note-taking should be discouraged. A means toward that end is to designate someone as secretary whose job it is to record the proceedings in the form of mimeographed reports which are made available from day to day, or meeting to meeting, to those participating in the conference.

Men usually attend in their shop clothes, and they are invited to smoke if they like, if it is not against the plant policy. Such conference groups naturally vary in size. Fifteen to twenty make a nice-sized group; more make such discussion groups less effective; and a smaller group is likely to be less stimulating.

(3) *Starting the conference.* It is well for the leader to become acquainted with the names of the members of the group, and also with the general nature of their work. To illustrate, it is well to know whether John Smith is foreman of the machine shop, the shipping room, or the maintenance department since this information is helpful in presenting typical problem cases to them that are in line with their experience. After each man has selected his seat at the conference table, the secretary may supply the leader with a seating diagram giving this information. The men may be asked to take the same seats in later meetings as that

will enable the leader to learn to know them more quickly than if the arrangement were changed.

From the outset the leader should make it plain that he will serve as chairman and that each person present will have the opportunity to contribute out of his rich experience. This is a good approach psychologically because adults like to be regarded as experienced individuals rather than as school children. The conference leader may tell the group that he is not an expert in many—or even any—of the lines of work represented at the conference, but that he hopes to assist those present through guiding the discussion. This guidance should be as tactful and natural as possible. The aim is to lead without appearing to do so; to set the stage so that mental activity is certain to take place.

If someone starts to rise to speak, suggest that it may be easier if everyone remains seated. The leader himself should also be seated unless he needs to stand to use the blackboard or to demonstrate something that can be seen better when he stands.

(4) *The conference in action.* Among the devices used by the conference leader to stimulate discussion are: (a) cases illustrating the points to be considered; (b) questions that call for definite information, for judgment or evaluation; (c) illustrations; (d) demonstrations—either by the leader or by others; and (e) anecdotes or stories that relate to the discussion.

"Cases" are quite as valuable to the conference leader as tools are to the craftsman. They may be originated by the leader and also by the group. He will use his judgment as to when to state his own and when to ask others to supply them. At first it is often advisable for the leader to go more than half way by giving actual examples of what he means by cases. This encourages the group to supply others.

Cases may be either real ones or they may be of a hypothetical nature. When actual cases are used, it is frequently wise to withhold names or details that would make them personal; if they are hypothetical, care needs to be exercised in making them true-to-life. Cases can be illustrated by the following examples:

(A) An electric motor caught fire in a manufacturing establishment. The foreman told one of the men to throw a pail of water upon it. Was this good or bad procedure, and why?

(B) Foreman, Tom Brown, sent one of his men to do some repair work in another department that was supervised by Henry Allen. Henry Allen did not like the way the workman was doing the job and ordered him to change the plans as originally given him by Tom Brown. If you were the workman, what would you have done? If you were in Henry Allen's place, what would you have done?

Visual aids can likewise be employed to advantage. The blackboard is quite indispensable. Objects, models, diagrams, samples, and charts may likewise be used to advantage.

At first a certain reserve toward an unknown leader is to be expected. But the "ice" will soon be broken, and everyone will participate. The leader will cleverly encourage some to speak more often; others will need to be checked. Many questions will be directed at the leader. It is usually best not to answer them directly, but to refer them to the group, or to ask other questions that may help the members of the conference to think for themselves.

The technique of job analysis can often be used to advantage with conference groups. Men can be taught to analyze their responsibilities, and to suggest ways and means of handling difficult problems.

(5) *Summarizing results.* As progress is made, the results should be evident. Each unit of work should be summarized either by some member of the group or by the leader. If the personal views of the leader are desired, he may state them, if he thinks best, *after* the others have spoken on the point, as discussion is not likely to be cut off when this plan is followed.

Frequently written reports of the main points covered are valued by those who participate, and also by the employer or administrative group. If a secretary takes the notes for such summaries, the conference leader will probably want to go over them with the secretary before they are typed, as it is very difficult for one unaccustomed to conference technique to select the most essential points that are made and present them in the best form.

(6) *Outcomes.* Discussions of the conference type stimulate cooperation among those participating, and, since these individuals are usually "key" people, such cooperation should normally

radiate through wider circles. By comparing ideas individuals learn to see situations from various points of view. Hence the conference helps toward more intelligent action. Indirectly such conferences develop job-pride by bringing out the value of the service that is rendered by the individual as a worker and also as a member of the whole organization. Many a man who is doing highly specialized, repetitive work is made happier through the realization that his work is an essential part of a large, worthwhile enterprise. Through group thinking many things are learned that would otherwise remain unknown. Conference technique stimulates initiative, calls into play desirable competition within the group, and forms a natural setting where individuals do necessary, discriminating thinking about their work. Incidentally, here, as in other discussion groups, there is value in bringing into the open problems that need to be studied in the light of impartial inquiry. It is probable that the indirect, intangible values derived through such conferences are more valuable than those that can be readily seen. One of these intangibles is a man's attitudes.

(7) *Development of attitudes.* There is abundant evidence to prove that the conference method of group discussion develops new and helpful attitudes. Many foremen enter the conference with the idea that it is largely for the benefit of the company. They soon realize that it is just as valuable to those who participate. It gives men self confidence; it extends their vision; it increases their morale. Few things are more important than one's outlook or attitude toward people and surrounding conditions. A foreman's first thought may be: "What can that fellow teach me—he knows very little about my specialty at which I've worked for twenty years." He soon learns that he is not facing a static situation where the leader attempts to pump in knowledge, but one in which he is given the opportunity—it is nothing short of that—to participate in creative thinking. His attitude changes. He learns more about group thinking, evaluating, and planning, and this attitude helps him to face the new problems the way they must be faced if they are to be met successfully. A cooperative attitude is very necessary. More people probably

lose their jobs through lack of willingness to cooperate wholeheartedly than through incompetence.

(8) *Using questions in conference procedure.* Experience in conducting conferences for foremen, and other adults, points toward certain modifications of the technique of asking questions as compared with the usual methods employed with high school pupils. Adults who are unaccustomed to conference methods are likely to feel embarrassed by direct questions which they cannot answer satisfactorily. It is consequently good policy to begin with "overhead" questions that are directed to the group as a whole. This tends to relieve the tension that some feel at the outset of the conference. It also stimulates thinking on the part of all individuals present. After the leader learns to know each member of the group, he can use direct questions to better advantage. Certain leading questions, such as asking a man with what department he is connected, can be used whenever they appear to be helpful to the discussion.

It is good practice at the outset to ask questions that are neither too difficult nor too easy. If the question is too difficult, discussion is retarded; and, if the question is too easy, the men may feel that they are thought of as inexperienced children. Hesitation to answer questions may be due to a variety of causes. The question might inadvertently touch upon a controversial topic which the men hesitate to discuss; or it may be that it is so thought provoking that they want to "think things through" before making a reply.

Just to sit around the table with men of ability is a stimulating experience for a shy man. So even though he may not say anything, he still is making progress. It is therefore expedient not to push such individuals into oral participation. Let them first get their "bearings."

If questions are asked, they should be phrased so that they cannot be mistaken for queries from someone who feels that he is superior in knowledge or experience. Adults appreciate being handled with consideration.

Time should not be spent on details that are of little interest to the group as a whole. Sometimes questions can best be answered by a humorous response, or by an apt story or illustration.

but never by ridicule or sarcasm. More often than not, questions asked of the leader may be handled best by asking for suggestions from the group.

If a member of the group asks a question of his neighbor in an undertone, the leader may ignore it if he believes that to be the best thing to do. Adults often do this at all sorts of meetings, and they might feel quite embarrassed if anything were said that smacks of schoolroom discipline. It would, no doubt, be better to pause a moment, or to direct a question to one of the men thus occupied, or even to call for an intermission if there are evidences of general restlessness or inattention.

10. The panel discussion. There is a variation of the round-table discussion technique which is used to advantage when the group is too large to work effectively through the usual round-table procedure. The plan appears to be much more recent than the symposium, open forum, round-table, and conference techniques. To the best of our knowledge it was first used by a college professor in 1929. But even then it was not called by its present name. We refer to *panel discussion*. The name was coined at the annual meeting of the American Association for Adult Education in 1932.⁷

The panel discussion differs from the round-table method, and also from the lecture-discussion method, with both of which it has some features in common, by placing the discussion leadership in the hands of a small group of individuals—usually from four to eight—who constitute the “panel.” They are preferably seated in front, and in plain sight of the general audience. A slightly raised platform, upon which tables and chairs are placed so that the panel will face the audience, and also one another to some extent, is desirable.

The length of time that is given to panel discussion meetings should naturally vary with circumstances. Cartwright suggests the following plan:⁸ That the first 10 minutes be devoted to the chairman who explains the purpose of the meeting, and who, through his easy manner and friendly attitude, must make the audience feel at home and receptive. The next 40 minutes can

⁷ Morse A. Cartwright, “Panel Discussion,” *Adult Education in Action*, pp. 350-92.

⁸ *Ibid.*, p. 392.

be used by the panel, and an equal length of time may be devoted to general discussion. This arrangement calls for a total of 90 minutes. It is to be understood that both the time allotment and the arrangement are suggestive and that they should be modified when it seems best to do so.

Although set addresses are out of order in panel procedure, it is not to be taken for granted that preparation is unnecessary. Considerable care should be exercised in selecting persons for the panel who have something worth while to contribute and who can express their views concisely and effectively. Each member of the panel should know in advance upon what general phase of the problem he is expected to speak. It is not that each could not discuss the topic from many angles but that less duplication is likely to result where each person understands the approximate limits within which his views are to supplement those of others. A preliminary meeting of the panel is therefore very desirable and, if that is not feasible, each should have a statement showing how he is to fit into the discussion.

11. **Presiding at the panel discussion.** The duties of the chairman are similar to those of the presiding officer at forum discussions, which were discussed in topic 3 of this chapter. In either case, it is the chairman's responsibility to put the audience at ease, to see to it that the speakers are heard, that individuals are treated fairly in the question period, that the various view-points are summarized, and that the progress made in the meeting be made known orally or in written form. When additional meetings seem advisable, the chair, in the absence of other arrangement, may ask for suggestions from the floor or he may suggest plans and ask for the wishes of the group. In other instances his judgment will suggest that such matters be handled by a committee. In any event, it is his responsibility to plan for follow-up meetings when the work started has not been completed. Suggestions may be sought in writing, or persons may be encouraged to express them orally if they prefer.

The presiding officer should make it plain at the outset of the meeting that a panel discussion is in reality an active, cooperative process of thinking and that consequently it is not the place for reading lengthy papers or giving set speeches which may not be

based on a thorough understanding of the nature and need of the group. The panel-discussion method should provide a natural setting in which people will have the opportunity to ask questions, to evaluate replies, and to contribute constructively. The presiding officer's job is to see to it that this happens.

12. The lecture-panel procedure. There is another form of group discussion which represents a modification of the panel-discussion method. It is known as the lecture-panel procedure, and consists in using a speaker or lecturer who presents his views in the form of a prepared address. This may take 30 to 50 minutes. After this, the panel, which is made up in much the same way as has already been described in the preceding topic, asks questions of the speaker, or of one another, and proceeds to discuss the topic from various angles. The members of the panel may agree or disagree with the principal speaker. After the panel has discussed the problem for a stated time, the audience is given the opportunity to participate in the discussion.⁹

13. The panel technique in high school. An experiment was conducted at the Bethesda-Chevy Chase Junior-Senior High School, Maryland, to compare the results of the Morrison unit method with the panel-discussion method in social studies.¹⁰ At the conclusion of 4 weeks of experimentation the first test of 75 items was given with these results: the panel group made a median score of 66 points; the control group, 61; and the Morrison group, 57. After the first test the panel and the Morrison group were interchanged and a second test was given. The panel group made a median score of 67; the control group, 63; the Morrison group, 59. In both tests the panel group scored highest in both factual questions and those requiring "understanding." The panel procedure did not help the pupils of low I.Q. as much as it did those of average or higher intelligence. Experience at this school would indicate that, when the panel-discussion procedure is used with high school pupils, much care must be exercised in planning the work. It can be made too informal and too general. An interesting manifestation of this experiment was

⁹ Studebaker and Williams, *op. cit.*, pp. 50-1.

¹⁰ J. Orin Powers, and Florence M. Black, "Exploring the Panel Method Scientifically," *Progressive Education*, 12 83-88, February, 1935.

the moments of silence when the pupils seemed to be adapting their thinking to the new situations brought out in the discussion. It clearly illustrated a give-and-take procedure such as is often met in adult life. A survey of the opinions of the pupils brought to light the fact that the great majority favored the panel-discussion procedure. In spite of the fact that the discussions were held immediately before the lunch hour, it was always a difficult matter to close the discussion periods. And even after



FIG. 23. A conference-leader training group in action, showing a representative conference setting with group arranged around tables, the leader at the center, and blackboards close at hand

that, some would remain to discuss points that were particularly challenging and interesting to them.

14. **Leadership for discussion groups.** It is generally recognized that intelligent and wise leadership is a most important factor in the development of group discussion programs that will be of evident educational value. To this end a considerable number of educational and social welfare agencies have set up training programs. They include an appreciable number of colleges, state departments of education, federal departments, such as the Department of Agriculture and the Department of Interior, the Federation of Parent-Teacher Associations, the Child

Study Association of America, the American Farm Bureau Federation, and a host of others.¹¹

But it is probable that by far the largest source of leadership is that which develops through actual experience "on the job." All over America groups of adults, and young people also, are meeting to discuss problems of mutual concern. Such groups often start in a very small, informal way. Those who take active parts in them are being trained for leadership just as certainly, and perhaps as effectively, as through organized classes for leaders.

15. The radio as a medium for discussion. In America as well as elsewhere the radio has come to be a force in shaping public opinion that is not to be ignored. It has been an important factor in the overthrow of European governments; it is a vital force in molding group action in the United States. The radio appeals strongly to the emotions. It brings to us the voice of the speaker so clearly that it seems like hearing him at close range. It has been but a couple of decades since the first broadcasting service was made available to the public, and today millions of receiving sets catch the message as if by magic. In order to determine, if possible, the educational influences of the radio and of other indirect means of education, Dr. Vierling Kersey, State Superintendent of Education, California, authorized a survey to this end. The findings are to the effect that *the total influences of these means of education are more powerful than those of the schools.*¹² This is at once a warning that these influences must not be overlooked, and a challenge to extend the scope of organized instructions through correlating and integrating school learning with these other influences.

16. Discussion groups for high school graduates. An interesting plan has been developed in one of the Detroit high schools which has the two-fold goal of (1) providing a means of keeping up educational interest on the part of high school graduates and (2) offering an opportunity to perpetuate the friendships and associations formed during high school days. A weekly program

¹¹ American Association for Adult Education, *op. cit.*, pp. 233-7.

¹² S. Howard Evans, "Radio in Social Studies Teaching," *Social Studies*, 23:101-3, March, 1937.

of discussion meetings was developed. Attendance is entirely voluntary. The organization constitutes a self-directing group. Co-operation is received from Wayne University, a municipal institution, and from the faculty of the high school. The results secured indicate that similar programs deserve to be conducted on a wider basis.

The usual procedure is to have an informal talk which is followed by a period given over to questions from the general group. A faculty sponsor selects a different chairman for each meeting. The chairman introduces the speaker and makes necessary announcements. The attendance averages in the neighborhood of forty-three. These meetings encourage the graduates to continue habits of inquiry, of study, and of reflective thinking.¹³

17. Discussion as a tool. Just as conversation, from time beyond written record, has been a tool that has been useful to advance learning, so in a similar way discussion, which is merely a special form of conversation, is likewise a tool for learning. Like other tools this one must be used intelligently. The various forms of group discussion that have been mentioned in this chapter are by no means fool-proof procedures of race progress.

One of the outstanding weaknesses of group discussions of various sorts is that individuals, not infrequently, show considerable readiness to discuss problems about which they have little knowledge. But discussion is a source of ideas. The individuals who enter into a group discussion learn from one another without half trying. In other words discriminating discussion results in growth. This growth may be in knowledge, but it may likewise be in worth-while appreciations; it may be in insight, but it may also be in equally valuable imagination. The various forms of group discussion have this in common: They all strive to make individuals *more articulate* and they all aim to develop actual *habits of group purposing and planning*—for in these lie our hope for betterment.

Conversation and discussion are valuable in that they enable us to see situations from various points of view and in a broader

¹³ Herbert S. Eges, "Discussion Groups for High School Graduates," *Social Studies*, 27 470-3, November, 1936.

setting than might otherwise be the case. The different viewpoints that are made known through group discussion enable us to re-think and re-evaluate in terms of changed circumstances of which we may not have been entirely conscious. Group discussion, then, appears to be an ideal way of adapting our thinking and our action to constantly changing circumstances such as confront us today and no doubt will also face us in the future.

18. Debating as a means of learning. Debating has long been considered a desirable form of development. Sorrenson has reported the outcome of debating as developed through discussion by a group of teachers at the 1931 convention of the Illinois Association of Teachers of Speech.¹⁴ The items follow as reported by Sorrenson:

In interesting himself in well-directed debating, a student:

- (1) Becomes more keenly aware of the large place which argument and persuasion have in human relations.
- (2) Forms the habit of relying more and more upon evidence rather than prejudice, tradition, and intuition in reaching conclusions.
- (3) Acquires a keener interest in the pursuit of truth.
- (4) Receives training in the accurate statement of ideas and facts.
- (5) Develops more fixed habits of intellectual honesty.
- (6) Becomes more skillful in the use of libraries.
- (7) Becomes more keenly interested in social, economic, and governmental problems.
- (8) Becomes better acquainted with the sources of reliable information upon social, economic, and governmental problems.
- (9) Acquires a better understanding of the fundamental principles relating to sociology, economics, and government.
- (10) Receives training in the use of scientific methods of gathering data bearing upon social, economic, and governmental problems.
- (11) Receives training in analyzing social, economic, and governmental problems.
- (12) Learns to test the value of data.
- (13) Acquires greater skill in interpreting data.
- (14) Learns to reason conservatively from data.
- (15) Acquires greater skill in organizing data.
- (16) Becomes a medium for the dissemination of knowledge of superior quality bearing upon social, economic, and governmental problems.
- (17) Becomes more skillful in presenting data clearly and attractively.

¹⁴ *Journal of the National Education Association*, January, 1932, p. 4. (Used by special permission of the publisher.)

- (18) Learns to adapt his point of view to that of others.
- (19) Learns to adapt reasoning and evidence to different types of audiences
- (20) Develops an appreciation of the point of view of others.
- (21) Acquires skill in presenting data with poise and confidence.
- (22) Becomes a more easy extempore speaker.
- (23) Becomes a more resourceful and forceful public speaker.
- (24) Develops a more expressive body and voice.
- (25) Develops a stronger and more pleasing personality.
- (26) Learns to present his views and the reasons for them with conciseness.
- (27) Forms the habit of refraining from expressing himself with confidence upon subjects regarding which he knows little.

19. Group discussion methods for pupils in industrial arts and vocational classes. The current professional literature dealing with group discussion of the types under consideration in this chapter is exceedingly meager when one has in mind pupils of high school age. It appears that up to the present the greatest application of these discussion methods, on the secondary level, has been made in the realm of the social sciences. But, as has been indicated elsewhere, industrial arts and vocational industrial education must also be integrated with the social and economic problems of contemporary life. They must educate for richer and fuller living and better functioning citizenship as well as for other things. These group discussion methods are being used effectively by adults including, certainly, those employed in industrial and manufacturing pursuits. As a matter of fact, the conference technique has been widely used for educating leaders in industry in the United States for about twenty years. It is reasonable to believe that this and other group discussion methods are just as effective in the area of industrial education on the high school level as they are in other phases of secondary education. And whereas the major portion of the time devoted to industrial arts and trade education will be spent in work of the manipulative sort, there still is need for discussion. For that portion of the instruction, the various group discussion techniques present new frontiers. It is to be hoped that more experiments with these procedures will be undertaken with industrial arts and vocational industrial pupils pursuing work on the junior and senior high school level.

PRACTICAL SUGGESTIONS FOR TEACHING

As an outgrowth of the preceding discussion the following points may be of interest:

1. The ability to carry on an interesting conversation and a worth-while discussion is learned through practice.

2. The lecture method emphasizes teacher effort; the group discussion methods, pupil activity.

3. Group discussion, under proper leadership, constitutes one of the most promising procedures for perpetuating democratic ideals.

4. In introducing group discussion on the high school level, the teacher may well serve as the first chairman in order to show, by example, how to conduct such meetings.

5. In later meetings all pupils should take turns in participating, each according to his ability, and all with a view toward developing greater efficiency and power.

6. It is the teacher's special opportunity to make constructive suggestions as to how successive group discussions can be made effective.

7. Group-discussion procedures, such as the forum, panel-discussion, and lecture-discussion techniques, largely eliminate passivity on the part of the audience and exhibitionism on the part of the leader or principal speakers.

FOR DISCUSSION

1. Contrast the lecture method with group discussion procedures.
2. Describe the Open Forum National Council.
3. Name six groups or agencies that sponsor forums.
4. What is propaganda?
5. Bring out points of similarity and of variation between conference technique and forum technique.
6. Distinguish between panel discussion and lecture-panel discussion.
7. Describe a radio forum.
8. Describe a forum of the newspaper type.
9. Mention a number of outcomes sought through practice in debating.
10. Evaluate the probable influence of the radio, the press, and movies.
11. Enumerate six topics in industrial education that are suitable for consideration through group discussion methods by pupils in the public schools.
12. On what basis can one justify the conference method of training for foremen, firemen, peace officers, and custodians?

13. What are the chief characteristics sought in a chairman for group discussions?

14. Should the chairman encourage, discourage, or be neutral about having the audience express conflicting points of view?

15. How may a chairman prevent emotional clashes and tension?

16. Explain how to handle the situation in which two individuals argue rather strenuously.

17. Give your views on the value of conference procedure as a means of teacher education.

18. Which of the group discussion methods seems most promising for parent-teacher meetings? Explain your view-point.

19. Indicate how you would handle the individual who wastes time in a group conference.

20. How may a shy individual be encouraged to participate more freely in group discussions?

21. What is the usual effect of stating problems in phrases that center around *how, why, what, who, or where*?

22. Indicate the advantages of a chairman using words that all can understand.

23. Why use the blackboard for conferences?

24. Why are many employers interested in the group conference type of leader education?

25. Is it advisable to give pupils study assignments before they participate in group discussions? Explain.

26. Should adults be encouraged to do supplemental reading or give thought to the topics that are to be discussed before the meeting is called? Afterwards?

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CHAPTER XII

SOCIALIZED INSTRUCTION

PURPOSES, EMPHASES, AND TECHNIQUES IN RELATION TO SOCIAL CHANGE

1. The need for change. It is very apparent, as Bruhacker has well said, that "there has been obvious and pronounced dissatisfaction with a social order that has hatched the most destructive war and the severest economic depression in history."¹ An honest backward look is sufficient to convince most observers that the nightmare to which Bruhacker refers has left in its wake widespread feelings of animosity which threaten the world with a repetition of that struggle which we hoped would free this and other nations for democracy; but there are evidences that democracy has slipped in many quarters. Glenn Frank says: "We tolerated but did not take seriously these Socratic skeptics who insisted upon asking where the nation was headed."² Even a casual glance at the current educational literature of recent years shows clearly that educators are realizing that we have arrived at the point of conflict between divergent objectives. "Dare the Schools Build a New Social Order?", "Education for Democracy," "Indoctrination in Education," "Freedom versus Regimentation," and similar titles indicate that educators are concerned about these matters.

It is quite evident that opinions differ regarding the extent to which the schools should strive to build a better social order. One point of view is that society maintains the schools because it has found them to be essential to its best interests and that it would be unthinkable to deny them the privilege of relating their work to actual life situations. "The issue is not," says Childs,

¹ John S. Bruhacker, "The Public School: An Example of the New Social Order," *School and Society*, 44:761-8, December 12, 1930.

² Glenn Frank, "The Alternative to Revolution," *Pennsylvania School Journal*, October, 1934, p. 63.

"whether the program of the American school should relate to the affairs of American society. . . . The *real* issue is, in what manner is the American educator to make this reference to his society."³ He holds that education is created in order to make cultural selections; that the school cannot be neutral on matters of this sort. It exists for the specific purpose of guiding learners. He believes, furthermore, that, since a number of our traditional beliefs and practices are no longer suited to changing life situations, educators should not be asked to transmit that which has been outmoded.⁴

There are other educators who take a more conservative view. They believe that the chief function of the schools is to maintain the *status quo*. The answer made by the more progressive educator to this latter proposal is that it fails to take into account the ideals and aspirations of a freedom-loving people. It tends to intrench those in power and to retard variations from present procedures. Nothing is more plain than the fact that we are in a period of far-reaching social and economic transition; that we must reckon with many economic factors that were not present during the earlier years when American society was essentially agrarian in nature; and that education must be related to vital life problems if it is to have a dynamic effect upon contemporary life.

2. Socializing education. We are living at a time when material and scientific development have far outstripped social understanding and control. Education nearly always lags somewhat behind the latest progressive practices. Even though we have been giving lip service to socialized education, there are many who do not know what socializing implies. In the past we have strongly upheld "rugged individualism." We have stressed the idea of individual rights to the point where many forget that with such rights there also go corresponding obligations. We have likewise talked of success in business as if it were purely an individual matter rather than one depending upon cooperation and social participation.

³ John L. Childs, "Should the School Seek Actively to Reconstruct Society?," *Education for Social Control*, p. 1.

⁴ *Ibid.*, p. 5

Individualized instruction has certain quite obvious advantages, but when it excludes socialization there is a real weakness. It is worth noting that such plans of individualized education as the Dalton Plan and the Winnetka Plan have definitely recognized this and have made provision for socialized group activities as well. It should likewise not be overlooked that even though certain forms of education are largely individual—as practical arts and vocational education—they nevertheless result in a good deal of cooperation. To illustrate: pupils may be working on individual assignments in the school shop. Under normal conditions they are encouraged to discuss their work with others; to exchange services where that is desirable or necessary; and to cooperate in the use of such tools, devices, or equipment as are common to the group. This is pointed out by way of contrast with certain other forms of instruction where individualized teaching results in almost total loss of socialized procedures. It is *not* to be inferred that individual instruction in the practical arts, because it usually leads to group cooperation, will *adequately* provide for the development of social attitudes, habits, and insights. On the contrary, it is believed that these latter attributes are so important that *definite group learning should be provided* to supplement individual instruction. The individualized form of education, while best at times, is not best all the time.

3. Some evidences of social trends. The demand for more socialized education is based upon the need as seen in contemporary life. It requires no evidence beyond what we already possess to convince us that there is greater economic dependence today than there was a quarter of a century ago. Many things have contributed to this. Among them are specialization, urbanization, and transportation.

Another trend of greater inter-dependence is evident in increased centralization in state and federal governmental functions. In recent years we have greatly strengthened group controls; we have thrown increasingly larger burdens upon state and federal, as distinguished from local, officers. We have also passed legislation which has strengthened group power.

Social trends are likewise evident in the growth of such measures as workmen's compensation, rehabilitation legislation, un-

employment insurance, and old-age pension provisions. It is true that at no time has the common worker had more rights and privileges than he now enjoys, and there is every indication that his *relative status will improve* through legislative and other measures that are pending, proposed, or contemplated.

Socialized education is designed to further democratic ideals and practices. Through socialized instruction it is proposed that youth be equipped to further: (1) higher standards of living for the masses; (2) a feeling of greater toleration toward those of other races or cultures; (3) a sense of greater personal responsibility for cooperating with others in the achievement of valid goals.

4. Changing concepts of socialization. Within the last ten or twenty years the term *socialized instruction* has crept into our professional vocabulary. It is a concept that is too broad to be expressed adequately in a concise definition. The basic idea is that of *educating for a progressively better society through cooperative effort*. Socialized instruction is that which develops attitudes, habits, appreciations, knowledges, and skills that are useful for the *perpetuation and improvement* of society. It emphasizes the development of group consciousness and of wholehearted participation in cooperative activities that are held to be for the common good. In some respects socialized education is the opposite of self-centered instruction, for it stresses group values rather than individual gain and consideration for others rather than self-centeredness.

Socialized instruction must always be adapted to circumstances. It would therefore be unwise to think of it in terms of hard and fast procedures. The emphasis is upon free, though teacher-guided, pupil interaction and upon relating instruction to real life problems. It is scarcely necessary to add that socialized education has nothing to do with any particular form of political creed. Just as there is no Republican or Democratic way of saving human life, so there is no partisan way of socializing instruction. In the United States socialized education centers around developing democracy—meaning by that the ideals and goals for which our republic stands. Our concepts of socialization change as we see the differences between outmoded goals and

procedures and those that give greater promise of functioning effectively in the present day. *Socialized instruction* is arrayed against teaching that is hampered by ignorance, prejudice, and mere tradition. It seeks to emphasize those learnings that give social insight, economic understanding, and that lead to intelligent cooperation in school and in the years that lie beyond the full-time school period.

5. *Outgrown concepts of the recitation.* Among the outmoded ideas about class instruction procedures is the one which views the recitation as "lesson hearing." In former years much of the emphasis was exactly where the derivation of the word recitation would lead us to believe it was—namely, upon "re," meaning back, and "citing," meaning repeating or quoting what was learned. Reciting, in the old sense of the word, no doubt served the purpose it was meant to fulfill when applied to catechetical learning sponsored by the early church. It may have served to transmit knowledge from one generation to the next one, but such a concept of learning is quite out-of-step with present knowledge of the learning process. Memorization serves some very necessary functions, but mere memorization may take place without thorough or even slight understanding. The test of genuine learning is not whether a person can repeat words, phrases, or facts, but whether he understands them, appreciates their import, and can use them effectively.

Another difficulty with the recitation as "lesson hearing" grows out of the fact that such a procedure creates wrong ideas about pupil-teacher relationships. The pupil instinctively feels that he is on the defensive—that the teacher is there to find out what he does not know. It will be admitted that checking and review are necessary functions in teaching, but the *major* emphasis should be *constructive*. The pupil should feel that the teacher is there to help, not to censure.

Mossman, Thomas, Thayer, and others¹ pointed out long ago that the traditional type of recitation is passing and that it needs to be modified in the light of present knowledge. Mossman believes that the word "recitation" should be replaced by a new

¹ Frank W. Thomas, *Principles and Techniques of Teaching*, pp. 264-86.

term that will better express the idea of coming together for purposes of cooperative thinking, planning, and accomplishment. Just as the old term "manual training" overemphasized "manual" and "training," so "recitation" has unfortunate connotations. Perhaps some such term as *discussion period* or *class period* may meet with greater favor in the future.

The older view of the recitation is likewise weak in that it centered rather pointedly upon an individual relationship between



FIG. 26 A view of the Oil Burner School of the Essex County Vocational Schools, Newark, New Jersey, showing how the progressive school adapts its program to meet the requirements of industry.

the pupil and teacher, as contrasted with that of involving the class as a whole. The worst feature of the old recitation method, so Thomas thinks, was the inquisitorial manner in which questions were asked. Lesson hearing may possibly do for a static social order but it is hopelessly inadequate in a time, such as the present, when social, economic, political, and moral changes come with breath-taking speed.

6. **The socialized recitation.** If the key-note to socialization consists in procedures that further and develop a progressively better life through cooperative effort—as was indicated—then the socialized recitation must stress pupil activities that will increasingly develop initiative and power to strive together. Let us

examine some of the particular procedures that are most promising toward such goals.

(1) *Lesson-planning.* Before consideration is given to pupil activities let us refer to what was said in Chapter VII about lesson-planning. If the teacher's lesson-planning anticipates a natural, social setting in which self-activity will be encouraged, it may be said that the first step in socialized instruction has been taken. Socialized teaching requires careful planning and much adjustment to unlooked-for situations.

(2) *Pupil planning.* Pupil planning under teacher guidance is essential to socialized instruction, not because the teacher could not plan the work effectively alone but because it would be short-circuiting the learning process to do so. Cooperative pupil and teacher planning is comparable to the way planning is best done in adult life and is an important *educational* procedure.

(3) *Group discussion.* Planning, doing, and evaluating that are done in line with democratic ideals will call for group participation. In socialized teaching the instructor encourages the pupils to ask questions of one another, to speak to one another, and to cooperate in every reasonable way. The chief advantages of doing this were brought out in the preceding chapter and will not be repeated here.

(4) *Individual initiative.* Education is always an individual matter even though group procedures are often used. Advance in any area of human activity calls for individual effort as well as cooperative activities. Consequently pupils are encouraged to make individual contributions which will then be related to the needs of the group. To illustrate, pupils are asked to study certain problems intensively and to report upon them in class. This individual report is then made the center of group consideration.

(5) *Reflective and discriminating thinking.* Since the hope of social progress rests largely upon getting persons to think carefully and with discrimination, on all major problems that affect our welfare, it is reasonable to assert that the recitation procedure should help to develop those kinds of abilities. The recitation is to be judged in part on the extent to which it uses every suitable opportunity to encourage critical, discriminative thinking, and, correlatively, by the extent to which it develops

articulateness or the ability to express effectively what is held to be true. To this end the pupil is encouraged to express his ideas clearly and fully. The ability to discuss problems thoroughly and in a logical, consecutive fashion is acquired very largely through *practice*. The socialized recitation aims to provide such practice.

(6) *Summarizing*. This consists essentially of "boiling down" into concise form the conclusions or points of agreement that were reached as the result of the study. Squeezing out the water is not always easy. The ability to distinguish between the valuable and the worthless, and the important and non-essential, is also largely a matter of education—something that must be learned through experience. Pupils can be taught how to summarize the main points of every lesson, every discussion, and everything that is read for instructional purposes. This looking for the high spots with the thought of future application is good learning technique.

7. *Social intelligence*. Among other outcomes of socialized instructional procedures, *social intelligence* deserves to be mentioned. We need something of this sort as a steering device for individual action and even more for group behavior in this age of super-power and mechanization. Perhaps more people fail to make good vocationally because they are short on social insight and understanding than fail because they lack the necessary trade skill or technical knowledge. Social intelligence is founded upon such basic virtues as considerateness and the desire to please others. One must possess social sensitiveness in order to see situations as others see them. Social-mindedness can be taught through repeated observation and practice. By teaching pupils to be considerate of one another, to work together harmoniously even under trying circumstances, to be polite and respectful—in short to live as best they can in accordance with the one rule that is essential to social welfare—the Golden Rule—that is how social-mindedness is developed. Social intelligence is needed to combat the individualistic and egoistic trends of our times. It is required to offset the possessive and competitive ideals of property rights that have been handed down from ancient times to a modern world needing greatly a truly social vision of property rights—one that centers in the idea of stewardship and sharing. Social

intelligence tells us that it is fruitless to educate the coming generation for a frontier economy that has all but vanished on the western hemisphere. A broader, more enduring horizon is needed to guide individual and group action today.

8. Other purposes of the class period. It might be inferred from what has been said that the sole purpose of the class period is to socialize the individual. This is perhaps true in a general sense but there are more specific and more immediate goals that are to be realized. Through these, in part, social adjustment takes place. Among the more immediate objectives of class instruction are: (1) The assignment of lessons or units of work so that each individual will work in accordance with his ability. (2) Motivating the work assignment in such a way that the pupils will attack their tasks with interest and enthusiasm. (3) Correlating and unifying learnings so that integration will result. There is so much incidental as well as unrelated learning that the *unification* of knowledge and experiences is imperative. (4) The mastery of subject matter. The latter is not a valid end in itself, but it is an essential means toward worthy goals. The schools must carry on an endless fight against ignorance, superstition, and outmoded practices. The mastery of factual knowledge, of scientific procedures, and of skill makes progress possible. (5) Drill to overcome the effects of forgetting and to provide a functioning degree of mastery is also needed. (6) The class period is likewise the time when group instruction can be used effectively for those elements of the work that are common to the group. This may include various forms of demonstrations, illustrations, visual or sensory aids, and explanations by the teacher or by pupils.

These examples of the purposes of the class period clearly show that it is not restricted to lesson hearing and that checking and drill and teaching for mastery are interwoven with the broader, more remote, and *less readily attainable* objectives of social understanding, social attitudes, and social habits, all of which are means toward the preservation and perpetuation of the American way of life.

9. Industrial education as a means of socialization. Socialization takes place in at least two ways. The first is through interaction or cooperation with others. The other is through using

the materials and by providing experiences that are typical of the life of the community or social group. Industrial arts education and vocational education, also, are well suited to adapting individuals to effective group living. In fact we may say that practical arts and vocational education serve as a *logical core* of essential learning and experiencing, around which other learnings may be grouped with a view toward effective socialization. It is generally recognized that the fundamental purpose of all secondary education is to enable youth to understand and to deal effectively with his changing environment. One may well ask whether there are any "subjects" or areas of learning that are as well suited as are practical arts and vocational education to serve as the core of progressive educational curriculums, which seek to integrate or unify learnings into a rational and understandable whole. Experience with elementary industrial arts in the Speyer School experiment, conducted by Bonser, and with other more recent experiments shows that the practical activities serve as an excellent core and source of motivation for effective learning. It is true that it is more difficult to cut across subject matter lines in the junior and senior high school, but, if "subjects" are to be retained, at least for the present, there certainly is evident need for greater correlation and unification of learnings than is now common.

Practical arts and vocational education are probably better suited than other aspects of education to serve as the core of truly socialized education for reasons such as these:

- (1) They enable learners to grow in understanding and appreciation through *doing*, involving multi-sensory learnings.

- (2) They present typical, challenging subject matter which is known to be drawn from present-day life, whereas most book learning lags behind the latest developments.

- (3) They appeal to young and old because nearly all people—and especially the young—are eager to express themselves through activities involving manipulative participation.

- (4) They provide the opportunity to combine enjoyable and socially valuable motor activities with equally essential intellectual growth.

- (5) A progressive society has no place for drones. Practical arts

and vocational education encourage the development of right mental attitudes toward all socially worth-while work, and they also stimulate necessary work habits. *There is danger in postponing such habit formation too long, as might be the case in schooling that is exclusively "academic" in nature.*

(6) Education based on "practical" or "doing" projects is distinctly socializing because the whole setting is life-like, stimulating, and energizing. The material, tools, and processes are representative of the modern power age, and the human relationships that ensue are such as make for cooperation, considerateness, tolerance, and open-mindedness.

(7) And finally, practical arts and vocational education, as areas of learning, have much in common with adult life; they call for *applied knowledge, for unified experiences, for integrated personalities.* They form the *logical basis or core content* which should be broadened and enriched through the contributions of other desirable forms of education.

10. Not all industrial education is socially conceived. Although practical arts and vocational education call for activities that are inherently social, in that they are closely related to life and involve settings that are life settings in miniature, it is also clear that they *may* be conducted in ways that are quite individualistic and self-centered. It is possible to have industrial arts education which stresses primarily motor skills, and it is likewise possible to so conduct vocational industrial education that it emphasizes personal advantages at the expense of group welfare. But the more narrowly conceived programs are gradually giving way to those that are planned with more socially valid objectives in mind. It should not escape notice that industrial arts and vocational education are relatively new as phases of systematic school instruction and that until recently professional education for teachers in these fields was on a relatively low level—more so in vocational industrial education than in vocational agricultural and homemaking education, and more so in industrial arts than in general home economics. Neither were the certification requirements for these teachers as high a decade ago as they are today. As a matter of fact, many teachers still employed in industrial arts and vocational education have had but a meager amount of

professional preparation. Most of them, however, are supplementing this in various ways. The development of both undergraduate and graduate instruction, for teachers in service, in these fields of education has been very gratifying. But an unbiased evaluation of present practices shows that the more narrowly conceived, strongly individualistic educational philosophy of the manual training era, and some even more self-centered view-points inherited from industry, still show in school practice. Some of the wrong views that have not entirely disappeared include: (1) The notion that a teacher's work should be finished when the closing bell rings. This idea is sometimes a hang-over from trade experience. It has been said that the man who is always listening for the whistle never comes to own the factory. And, furthermore, a school is not a factory. (2) The idea that industrial arts education is vocational, or "semi-vocational." This false idea sometimes leads to placing practically the whole emphasis upon manipulative skill and narrowly interpreted related information. It is confusing the major objectives of industrial arts and of vocational industrial education. (3) That it is proper for a teacher to guard as "trade secrets," not to be made available to other teachers, information or knowledge that he happens to possess which has enabled his pupils to do superior work. Would we consider it right for the doctor to withhold from the medical profession knowledge which might relieve suffering or save life? Are teachers not comparable to those who minister to our physical ailments? (4) The erroneous idea that teachers of practical arts and vocational education are "special" teachers. The sooner we get rid of that idea the better it will be for the teachers concerned. They should be regarded as *regular* teachers, since their work is an essential part of a democratic program of secondary education. "Special" teachers are usually the first to "go" in time of economic stress. Although the requirements for licensing teachers of practical arts and vocational education should vary from those of others, the professional requirements are becoming more nearly alike. That is, the time is past when trade experience alone will qualify a man to teach shopwork on any kind of school level. In the future there will be a distinct increase in the proportion of trade teachers who are competent vocationally and who are also

college graduates with excellent professional education. (5) And, finally, that practical arts and vocational education are primarily individualistic; that they exist chiefly to help the individual; that it is all right if the individual thinks and plans for his own advancement without much regard to others. The fallacy of such a line of reasoning is too obvious to require explanation.

11. Some implications of socialized industrial education. There must be no set pattern for socialization. Freedom to adapt means to ends is very essential. On the other hand, there are certain elements or values that are likely to lead toward the goals sought.

It has been said before, and it will bear repetition, that education is life, and that it is also preparation for life. Industrial arts education will be socializing to the extent that the attitudes, habits, and learnings of whatever kind are *representative* of present-day life. Industrial arts deals, or should deal, with life situations as they are today and are likely to be tomorrow. The try-out and exploratory experiences given must consequently be more varied and more rich than they now are. We must find ways and means that will give pupils a *clearer, truer, and more intelligent* insight into the vast realm of industrial and manufacturing pursuits. Industrial arts education must be *more representative* of the life outside of school, and it must deal more effectively than it has with the social, economic, political, and moral problems that face men and women in all walks of life. This will be done in many different ways. It is probable that more first-hand contacts through school journeys will be demanded; that visual and sensory aids will be used much more extensively in the future, thus greatly extending learning vicariously; and that old materials and projects will give way to others that are in keeping with the times. The general industrial arts shop should be flexible enough to include many things not now generally undertaken in it. Unit industrial arts shops will likewise greatly enrich their offerings. Enrichment is possible in quality quite as much as in quantity.

12. Efficiency as a social aim. "Efficiency," says Brandeis, "is the hope of democracy. Efficiency means greater production with less effort and at less cost, through the elimination of unnecessary

waste, human and material."* He asks, "How else can we hope to attain our social ideals?" This is indeed a searching question. Efficiency has long been a major objective in vocational education. There is every reason to believe that this emphasis is correct. As long as America exchanges goods with foreign countries, and even if the attempt should be made to make the United States a self-contained, independent unit which would restrict all imports and likewise exports, there would still be a clear need for efficiency.

Vocational efficiency, rightly guided, will make for social welfare, but this same efficiency under improper advisement may prove to be a boomerang. This is why vocational as well as non-vocational education must proceed in line with sound social ideals. It is why vocational as well as other teachers must socialize their instruction.

The "right to life," as guaranteed by the Constitution of the United States, is today interpreted to mean the right to live more abundantly—the right of each individual to develop in accordance with his abilities and effort, in so far as they are socially right and valid. Vocational education must continue to stress occupational efficiency, but not to the exclusion of integrating knowledge and unifying wisdom. A social attitude toward life is absolutely basic to sound vocational education, and social habits must be developed through it if it is to measure up to the demands of the day. We have been so absorbed with the physical or material aspects of occupational efficiency that the less tangible but equally necessary aspects of social efficiency have sometimes been neglected. It cannot be denied that vocational education has at times been thought of in terms that are narrowly utilitarian, but it is likewise clear that modern vocational education, in all its major phases, is striving for occupational efficiency which is to be used in harmony with socially valid goals. In other words, vocational education is thought of as one aspect of more complete living. It is being sensitized with purposes that are social in outlook—it is social in effect.

13. Leadership versus domination. In his analysis of the qualities that make men leaders, Pigors has called attention to the

*Louis D. Brandeis, *The Curse of Bigness*, New York, The Viking Press, 1934.

fact that, where there is leadership, the cause involved is one that is held in regard by both leader and follower.⁷ Where true leadership exists, the relationship of higher and lower is relatively an unimportant matter because all are working for a common cause. But in domination this is not the case. The cause is one thing, and the dominator's desire for power is another, so that position, rank, or social status take on a different meaning. There is consequently not the same whole-hearted cooperation under domination as under leadership. Socialized instruction obviously calls for educational leadership as contrasted with domination. Individual initiative and group action are by no means spontaneous processes that function effectively without guidance. They call for patient, repeated instruction and for painstaking and thoroughly social leadership.

Real leadership in education helps to develop in learners a kind of creative imagination which is akin to inventiveness. The teacher who leads rather than dominates realizes that resourcefulness and initiative are not limited to the few, but that all individuals possess these qualities, each in varying degree. When fusion between worthy causes and individuals takes place, it is amazing to see how the cause helps to deepen and broaden the individual. People grow through the causes they serve; their personality is deepened and their ability is developed much in proportion to the challenges and the demands of the cause.

14. *Self-government as a device.* Various plans of pupil participation in management are used as means of developing individuals in the qualities and abilities that are needed in a progressive social order. As a general policy it is felt that every individual should be encouraged to become as resourceful as possible. The various procedures that call for individual initiative and for cooperation should be selected with regard to specific individuals, for there is danger as well as promise in experiences demanding leadership. Most pupil government is best carried on under adult guidance. Pupils should learn to take responsibilities but this learning requires careful guidance. How can we expect young people to carry out managerial and supervisory functions effec-

⁷ Paul Pigos, *Leadership or Domination*, Boston, Houghton Mifflin Co., 1935, p. 203.

tively when we adults are not always able to perform these duties efficiently?

To put a pupil in charge of the toolroom, the supply room, or in charge of the shop without proper instruction and without checking to see how well he can perform his tasks is far from good

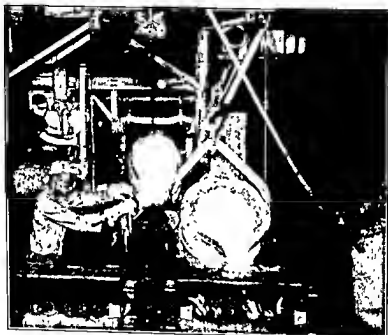


FIG. 27. This too requires skill and stamina. A view in a Chevrolet foundry where 2152 tons of molten metal are poured in one day.

teaching technique. As the learner grows in resourcefulness and competency, the amount of teacher supervision can be reduced. There can be no hard and fast regulation concerning this pupil-teacher relationship. The instructor must use judgment in this process of stimulating initiative, of furthering cooperation, and of developing social mindedness.

15. Evidences of socialized industrial education. Socialization of instruction is more a matter of attitude and spirit than it is of external form. It is possible to organize industrial education ac-

tivities that copy forms of organization in the world of work without much social gain. To illustrate, the fairly common practice of having pupils serve as "shop foreman" or "shop superintendent," or as "assistant foreman," does not necessarily develop social ideals or habits. We must go beyond the *form* of class organization, management, and teaching and check on the spirit and the objectives that prevail, in order to judge whether so-called socialization is real or not. Merely to adopt a general plan, such as the project method of procedure, or informal activity will not produce the best results. There must be definite planning according to sound principles, and certain responsibilities will need to be assumed by the pupils on the one hand and by the instructor on the other. The instructor, as the more mature and more experienced leader, is responsible for the general plan which is to interest and challenge the pupils to undertake activities that are most likely to be of maximum value to them. The pupils have the responsibility of assisting in their growth and development by learning to think clearly, to evaluate fairly, and to work constructively. It is their function to learn to make suggestions, to participate in group activities, and to develop the personal traits that will speed up their own physical, mental, and moral growth.

TABLE IX

FACTORS IN JUDGING THE SOCIALIZING VALUE OF INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

- (1) Is the pupil-teacher relationship a democratic one, or is it of the dominator-follower type?
- (2) Do pupils cooperate freely and effectively?
- (3) Do pupils show good sportsmanship under trying circumstances, as when they must wait for their turn to use tools or machines?
- (4) Are there abundant evidences of pupil initiative and resourcefulness?
- (5) Is the work closely related to vital life needs?
- (6) Are pupils encouraged to make suggestions?
- (7) Are group discussions used when applicable?
- (8) Are pupils encouraged to evaluate their own work and that of others?
- (9) Do pupils ask stimulating questions of one another and do they respond appropriately?
- (10) Are the pupils considerate of one another?
- (11) Are the pupils satisfied to copy designs slavishly, or do they strive for originality where the latter is desirable?
- (12) Does the instruction, taken as a whole, give pupils that wholesome outlook and that joyous acceptance of work as a way of happiness, which is their due?

One of the important purposes of socially centered education is to aid individuals to learn how to work together, how to enjoy well-earned leisure, and how to live happily.

In judging the extent to which industrial arts and vocational education is socializing in influence, factors such as those mentioned in Table IX may be considered.

PRACTICAL SUGGESTIONS FOR TEACHING

In bringing this discussion to a close, let us call attention to suggestions that follow herewith.

1. Young people, as well as older ones, put forth their best efforts when they have a share in planning.
2. Social adaptability, such as courtesy, tactfulness, and helpfulness, can, and need to be, taught by all teachers in the school.
3. Socialized education brings out the relationships between important life problems and what is learned in school.
4. Depth of appreciation, which calls for understanding and emotional response, can be taught effectively through learning centering in "doing" activities.
5. Socialization includes the development of good study and good work habits.
6. The process of socialization goes on outside, as well as inside, the school buildings. It is possible that the outside-of-school influences are more powerful than those exerted by the secondary schools.
7. Good will is necessary for good work.
8. Capacity for creativeness and initiative is possessed by all—but in varying degree
9. Effective socialized education is not a process of sugar-coating bitter pills or of giving soothing syrup from a silver spoon.

FOR DISCUSSION

1. Illustrate what is meant by a social-economic situation that is applicable to class discussion
2. How can the machine be used for social ends?
3. Evaluate the following as a school policy: "Keep things running smoothly and avoid controversial topics"
4. Is it reasonable to expect industrial teachers to concern themselves with socialization? Explain

5. Explain in what respects the lesson-planning based on the formal steps attributed to the Herbartians falls short of present ideas about socialization.
6. Differentiate between the older and the newer concept of the "recitation."
7. Compare the older and the newer ideas of the chief purposes of (a) industrial arts; (b) trade and industrial education.
8. What is meant by propaganda? Is teaching the ideals of democracy propaganda? Of autocracy?
9. Explain what is meant by social intelligence. How may it be furthered?
10. In what ways are industrial arts socializing? Vocational industrial education?
11. Describe how "self government" should be handled in your area of special interest.
12. How may pupils be encouraged to ask helpful questions of one another?
13. How may originality in design be stimulated?
14. Suggest several ways in which pupils may be encouraged to make helpful suggestions.
15. How may pupils be taught to express themselves clearly and forcefully in group discussion?
16. To what extent are group planning and other forms of group discussion practical and desirable in your field of major interest?

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CHAPTER XIII

PLANS INVOLVING UNIT ASSIGNMENTS

THE DALTON, PROJECT, PROBLEM, CONTRACT, AND OTHER PLANS

1. Related teaching techniques. In this chapter it will be our purpose to consider a number of teaching procedures which have a rather important common element—namely the unit assignment. *By a "unit" assignment is meant a coordinated major subdivision of a "course" or area of learning.* A good instructional unit is one that, in content and scope, is well suited to teaching purposes. Some units should be relatively short, others longer; some need to be relatively simple, others more comprehensive. The basic idea is that the unit should be an integral, wisely selected part which belong together as far as learning is concerned. One must not expect units of instruction to coincide with, or to follow in, the order in which production units are organized, though there are instances when they should follow that order—especially in vocational education.

It is not difficult to show that in production work the successive units of work seldom follow one another in an order based upon learning difficulties involved. For instance, to lay a solid foundation for a bridge where adverse conditions, such as quicksand or a raging torrent must be dealt with, may be more difficult than to build the superstructure. To design a dirigible is probably more difficult than to build it. So the job of working out units of work for production purposes is one thing; to work out units of instruction, each of which is a stepping stone to higher achievement in *learning*, is quite another matter. Obviously we are here primarily concerned with the latter function.

Though differing in name and varying in many respects, the forms of instruction discussed in this chapter have much more in common than they are popularly held to have.

2. The Dalton Plan. One of the best-known plans employing unit assignments is the Dalton Plan developed by Helen Parkhurst at Dalton, Massachusetts. It is said that whereas America has had a large part in originating the plan, it is more popular in England than in the United States. The plan was projected in 1919 and was put into practice in 1920. Two years later Miss Parkhurst published *Education on the Dalton Plan*, and Miss Evelyn Dewey wrote *The Dalton Laboratory Plan* during the same year. The underlying idea is that *classrooms should be thought of as laboratories or workshops where essential work is to be performed.*

The success of the plan hinges largely upon the formulation of a series of unit assignments sometimes called "jobs" or "contracts." Miss Parkhurst says the aim of the Dalton Plan is a synthetic one; it suggests a simple and effective way in which the school can function as a community. As guiding principles she places freedom first—meaning freedom to study what a pupil wishes—and cooperation or working together second. The emphasis upon pupil-centered activity versus teacher control is evident in the plan.

Students of education will recognize certain relationships between the Dalton Plan and the plan of Montessori. There are reasons for believing that the plan is not entirely American in origin any more than manual training can be said to have originated specifically in one country. The Dalton Plan, and modifications of it, have developed on both sides of the Atlantic in a quite natural way as an expression against traditional procedures. John Adams of the University of London said: "Perhaps the most dramatic and systematic break away from the class teaching-unit is supplied by what is widely known as the Dalton Plan."¹

Under the plan each pupil undertakes successive jobs or contracts which he completes as rapidly as his ability and effort permit. This provision for progress at variable speeds is commendable. But, if all the time were devoted to individualized instruction, there would be a definite loss in socialization. In order to overcome this the Dalton Plan provides for both individual and

¹ John Adams, *Modern Developments in Educational Practice*, New York, Harcourt, Brace and Co., 1923, p. 162.

group activities. As originally proposed the units of work were intended to involve about a month's time, but more recently greater flexibility in this matter has been advocated by Daltonians, so that work assignments covering from two to six weeks of time are not uncommon.

The difference in emphasis in teacher-pupil relationships, as compared with the older conventional procedure of teacher-dominated instruction, is seen in that the Dalton Plan aims to employ the teacher as a guide and helper if and when such guidance or help is necessary *to assist pupil initiative*. The teacher is expected to give explanations of points and to show obscure relationships between the work in hand and the general principles that are to be deduced from it. It is likewise the teacher's responsibility to explain assignments and to make suggestions concerning the use of equipment.²

Miss Parkhurst was of the opinion that assignments under the Dalton Plan should be invariably written, not oral. In present practice oral amplifications are sometimes used. This ought to be determined on the basis of the nature of the work and the maturity of the learners. What is essential is a clear statement of the work to be done. The plan stresses individual responsibility for budgeting time and for completing the assignments.

When such a plan is put into practice it will be found that some pupils need more guidance and more frequent checking than others. The majority will go at the work whole-heartedly but a few have not learned to assume responsibility. In a city of 50,000 people where the plan was used for vocational industrial as well as general education, the opinion of teachers and pupils was favorable to it for several years. It was given up in this particular school system because it was held to be somewhat more expensive than the more common form of organization. It is probable that instructors must put forth at least as much, if not more, effort under the plan than under more common plans of teaching, but there is a fascination and a thrill that comes from seeing pupils develop resourcefulness and power which more than offsets

² Evelyn Dewey, *The Dalton Laboratory Plan*, New York, E. P. Dutton and Co., 1922, p. 75.

any additional effort that teachers may have to make under this plan.

3. **The Dalton Plan in action.** After experimenting with the Dalton Plan for three years, Dr. Lucy L. W. Wilson and her staff at the South Philadelphia High School for Girls have issued a book which sets forth their views. The fundamental principles of the plan, as they have interpreted them, include:

(1) *Individualized instruction.* This is sought through: (a) having pupils work to capacity in spite of individual differences; (b) freedom coupled with responsibilities that help to stabilize personality; and (c) means of "community living" or socializing experiences that will drive home the fact that no individual or group of individuals can effectively live independently of one another.

It is recognized that individual instruction did not originate with the Dalton Plan, nor is it restricted to it. Following the lead of the San Francisco State Teachers' College, the faculty at the South Philadelphia High School for Girls has abandoned the usual form of recitation in lieu of "self-instruction bulletins." In developing these Dr. Wilson and her staff have made definite provisions for individual differences and for socialization.³ By working out assignments so that there are certain minimums that all must meet and optional assignments for the more gifted, the content can be adapted to varying abilities.

"Stabilization" coupled with freedom is sought through helping the child to budget his own time for about half the time which is "free." Informal type of school furniture and the work-room or laboratory spirit, which is better known to teachers of the practical arts than to those in the "academic" areas of instruction, help to give the Dalton classroom a more natural, and in the eyes of many, a more effective setting than the usual classroom.

Much emphasis is given to written assignments that use pivotal questions so that the pupil gains in strength. Short but frequent summaries are also used to advantage. Assignments are made in the light of particular individuals. Check-ups are planned with reference to individual needs. These are administered in various

³Lucy L. W. Wilson, and Others, *Education for Responsibility*, New York, The Macmillan Co., 1927.

ways. Some of them are self-corrected; others are checked by fellow pupils; and still others are corrected by the teacher, or are handled through pupil-teacher conferences.

Although pupils are normally expected to complete an assignment before another is begun, this is not always insisted upon. Each case is handled individually. Conference periods for teachers are scheduled so that the instructor has non-conflicting hours for every group that is taught. These conferences may last from five to forty-five minutes. Well-made assignments reduce the need for personal conferences.

4. **The Winnetka Plan.** As has been mentioned previously, it is generally recognized that it is desirable to permit individuals to progress educationally according to their ability. Some educators hold this to be impossible with the conventional form of organization. They feel that uniform class requirements must be abandoned. One of the first efforts in this direction to come to public attention was the Pueblo Plan that was developed in the Colorado city bearing that name. Somewhat later President Burk of the San Francisco State Teachers' College evolved a more comprehensive plan based on unit assignments. But this plan did not meet with hearty support. It was not until Dr. Washburne, a former assistant to President Burk, developed a variation of the unit assignment plan that it became widely known as the Winnetka Plan.

Winnetka, Illinois, is a beautiful residential district situated north of Chicago, bordering upon Lake Michigan. The city has long been favorably known for its efficient government and a city manager plan, and for its progressive schools. In the Winnetka Plan the unit assignments are called "goals." Approximately half the time is spent in individual work. There are no recitations. Each child prepares the work involved in the goals, checks his results with answer sheets, and goes on to the next goal if his accomplishment is satisfactory. The other part of the school day is spent in group activities that are designed to develop desirable social attitudes and habits. There are no tests or fixed requirements and no uniform goals for these group activities as there are for the individual assignments. In this respect the group activities differ from those under the Dalton Plan where socializa-

tion is sought through definitely planned group study. Some educators believe that the latter way of developing social qualities is superior to the Winnetka Plan of depending upon chance interests or unselected free activities. On the other hand, it is well known that children are likely to be most purposefully active when they, rather than the teacher, select or appear to select their activities. On the positive side, both plans have the desirable feature of stimulating initiative and of permitting progress at variable speeds. That good results are secured under both plans is beyond question. Good teachers and alert administrators will produce good results even if the plans, as such, are not particularly superior. Methods of teaching are important and plans of procedure have a distinct contribution to make, but good teachers are more important.

5. The Eureka Plan. In Eureka, California, a plan has been put in operation that is of interest because it uses the principle of grouping pupils on the basis of purpose and goal. Five classifications are used. They are as follows:

(1) *Group I*. This is for pupils who are preparing to enter institutions of higher learning. There is a distinct advantage in having such a group as the curriculum for them can be molded with college entrance requirements in mind. Emphasis can also be given to those elements that are most likely to prove helpful to such a group. The professions can be studied intensively and the pupils may be taught how to select an institution of higher learning that is well suited to their needs.

(2) *The probation group*. This group is made up of pupils who desire to enter an institution of higher learning but who have either failed in not more than one course in Group I, or who have been transferred from other groups. The probation section is a trial section in which pupils do not stay long.

(3) *Group II*. The pupils in this group do not plan to enter college. They are headed toward business or vocational pursuits that do not require post high school instruction given under the auspices of institutions of higher learning. Many of them will learn their vocation as helpers or assistants "on the job." Others will serve some form of apprenticeship.

(4) *Group III*. This is made up of pupils who remain in high

school for one or more years but who do not complete its graduation requirements. Counseling, placement, follow-up service, and up-grading instruction through evening, part-time, or home-study classes are what this group needs most. It is encouraging to see how public opinion is swinging toward extending service to this group.

(5) *Part-time group.* This classification is made for pupils who come within the provisions of the compulsory part-time or continuation school law. In some states this means employed boys and girls from 14 to 16 years of age; in other states, boys and girls from 16 to 18; and in still other states, boys and girls from 14 to 18. Since 1928 the number of pupils attending compulsory part-time or continuation schools has fallen off very much.

These five groups, then, constitute the classification followed at Eureka. It is evident that grouping on the basis of "purpose" is not synonymous with "ability" grouping. Both purpose and ability as well as interest need to be considered in determining the kind of education an individual should try to secure and the kind of occupation he should follow.

6. *The Morrison technique.* In the Eureka Plan the major emphasis is upon assignments based upon common purpose and interest. Somewhat in contrast with this, but likewise possessing elements in common, are the "units of understanding" as stressed by Morrison.⁴ He emphasizes the value, in the natural and the social sciences, of insights and attitudes toward people, situations, and life problems. Morrison's stress on getting at the basic concepts of relatively large units of learning has the merit of minimizing instruction in unrelated facts and putting the major emphasis upon correlating and integrating knowledges and experiences.

Since it is very probable that emphasis on "units of understanding" has just as much validity in industrial arts and trade and industrial education as in the physical or social sciences, let us examine the steps suggested by Morrison with a view toward using or adapting them to our individual areas of major interest.

(1) *Use of pre-tests.* It is suggested by Morrison that the first

⁴H. C. Morrison, *The Practice of Teaching in the Secondary School*, Second Edition, Chicago, The University of Chicago Press, 1931.

step in teaching a large unit of work should be in the nature of some suitable pre-test which will give the instructor a fairly accurate idea as to what each pupil already knows, or what he can do in the area of learning that is to be taught. No one can well quarrel with that suggestion. It is a good plan. Many teachers in industrial education are doing this.

(2) *Presenting a picture of the new unit.* The second step in the plan consists in motivating what is to be learned by giving a brief picture or "presentation" of what is to be covered. This is generally considered a very essential step in making vitalized "lesson" assignments. It is to be understood that the "presentation" is not to be time-consuming or of the formal type, but rather in a manner that develops interest and zeal. This is the teaching step, and it is based upon the belief that learning must be done by the pupil under teacher guidance and assistance.

A step in the cycle is to test what has been taught. The purposes of the test are many fold. A good test not only measures pupil achievement but it also serves other essential functions which need not be enumerated here, except to say that its purpose, in part, is to measure the degree of success with which the teacher has "presented" his learning unit.

(3) *Assimilation.* The third phase in the cycle is called assimilation. It amounts to an extended work period in which the skills, knowledges, appreciations, and insights involved in the unit are mastered to the extent expected. Directed study, self-instruction, and group learning all may have their proper place in this phase.

(4) *The recitation.* The last step in the teaching cycle is the recitation. The emphasis here is upon each pupil making thorough preparation and presenting his findings or view-points in a comprehensive way. Clear, unified exposition is desired. This is a worthy objective. To be able to express oneself in a logical, sequential, and forceful manner is indeed a valuable ability—one that can be developed to a considerable extent through frequent practice such as this plan embraces.

In brief, the Morrison "mastery formula" is: pre-test, teach, test the result, adapt procedure, teach, and test again to the point of actual learning.

7. The project method. At the dawn of the present century the term "project," as far as we are aware, was unknown as a professional term applied to secondary education. But during the last quarter of a century much has been said and written about this procedure. It is well, at the outset, to understand that the "project method" is much more inclusive in its implications than the term "method" interpreted in its narrower sense would lead one to infer.



FIG 28. Another view showing how the public schools give valuable pre-employment instruction. Here we see a group of boys deeply interested in automobile ignition.

As far as is known, the term was first used in a professional way to refer to certain aspects of secondary education about 1908, when Dr. David Snedden, then Commissioner of Education in the Commonwealth of Massachusetts, and his associates, Dr. Rufus Stimson, Dr. Charles A. Prosser, and Dr. Charles R. Allen, applied the term to practical arts and vocational education. The choice of the term was a fortunate one, for it implies purposing, planning, and doing under school conditions what men and women do in the world of work when they undertake "projects." A few years later others, primarily interested in general education, realized that the "project method" is just as ap-

plicable to non-vocational as to vocational education. There appears to be substantial agreement on the following points.

(1) *The project method is a large-unit plan of teaching.* A "project" as used in education constitutes a learning unit of appreciable length, difficulty, and learning value. To file a saw or to sharpen a plane iron is a series of a few operations. They may be called "jobs," "operations," or "exercises" but hardly "projects." In order to be worthy of the latter designation the work should show certain elements that will be mentioned presently.

(2) *The project method calls for whole-hearted purposeful activity.* When the project method is used the instruction must be pupil-centered. Whole-hearted activity cannot be that which is done under autocratic, dictatorial control. The project method implies that the instructor will so manipulate the "setting" that pupils will enter into the work with enthusiasm, optimism, and zeal. It can scarcely be called whole-hearted and purposeful activity when the learning consists largely of following a set of carefully detailed job sheets that contain all the essential facts and that certainly do not encourage, or even permit, the pupil to do his own reasoning. Nor can it be considered pupil purposing and planning—except in a very limited range—if pupils are given plans and specifications and told to put them into practice. What has here been said about instruction sheets and other plans is not to be taken to mean that they are not desirable—far from it. We are merely trying to show what the project method involves and what is foreign to the theory upon which it is based.

(3) *The project method calls for instruction in a natural, life-like setting.* For educational purposes "life-like" means like life at its best—as it should be in America. For us at least it means life that is socially conceived and democratically carried out. It means life in which realism and idealism are fused in proper proportions for the best interests of all.

(4) *The project method seeks to have individuals see and understand life in its unity.* In common with certain other large-unit plans of teaching, the project method would have the learner look for the unifying elements in units of learning. It would teach us, not an endless series of unrelated facts, but would have us relate those facts and experiences in such a way that *integration*

communication, transportation, manufacture, trade, and commerce, and so become familiar with the lives of peoples as they relate to the study in hand, is indeed a proper phase of teaching through the project method.

(7) *The project method seeks to develop planning abilities.* An important goal in the project method is that of giving each individual as much practice as possible in planning activities that are undertaken. *Pupil planning*, under teacher guidance, is considered indispensable. This planning should involve both individual planning, as when a pupil is called upon to plan the work that he alone is to do, and group planning, as when a group project is to be undertaken. It is essential to provide for both types, because both are typical of common life situations. Abilities in planning need to be meshed with abilities to cooperate and to take whatever part seems appropriate. Individuals must learn to work with others, and upon occasion to follow the suggestions and directions of others. Pupils need to be taught to lead when that is desirable and to cooperate heartily with others by putting their shoulder to the wheel when that is necessary. Leadership and initiative need to be stressed, but not to the point where the pupil gets the false notion that he should always be the one who determines plans of procedure.

Group planning is especially helpful in developing democratic ideals and habits of team-work such as are greatly needed to improve the quality of local, state, and federal government; to settle, fairly, disputes between employees and employers; and to promote satisfactory family life, which is the nucleus of national welfare.

Planning abilities are developed by teaching pupils to do their own thinking and by guiding them, bit by bit, so that they will willingly assume responsibilities for seeing a project through from start to finish.

Since success or failure, satisfaction or annoyance are potent factors in learning, it will be seen that projects must be selected that can be completed with a reasonable degree of satisfaction and within a judicious length of time. Interest in projects will wane if the enterprise is too easy, too difficult, or too extensive in time requirement.

(8) *The project method calls for the development of doing abilities.* The method is one that centers in doing interpreted broadly. Sometimes this learning through doing is largely individual. But at its best it will also involve group activities or socialized doing activities. It has already been indicated that motor activity alone is insufficient, but the manipulative work is often an ideal center for coordinating related learnings and for putting them to practical, objective tests. The project method is a means of bringing out latent pupil power in becoming sensitive to life needs; in planning cooperatively and in working together harmoniously and effectively. An important difference in goals between learning as viewed in the traditional manner and as conceived in the project procedure is that in the latter the major emphasis is upon *growth through activity on the part of the learner*. According to the older view, learning was considered a kind of stuffing process in which the teacher acted as upholsterer, whereas the advocates of the project method look upon self-directed, though guided, activity as a major means of individual development.

(9) *It teaches individuals to judge results.* It is good teaching when the learners are constantly on the alert to compare what they do with accepted standards of accomplishment. Through the project method pupils are taught to compete with their own best previous performances and they are guided in evaluating their own work, step by step. They are likewise encouraged to judge the work of others—not casually, but carefully, constructively, and sympathetically. Is it possible that life habits of so evaluating the work of one's associates may thus be built? And if so, would such habits be an asset in later years? Since much of the instruction is with things that can be measured rather accurately and objectively, perhaps it is not too much to suggest that the practical arts and vocational education are ideal mediums for developing, in individuals, habits of analysis and of judging fairly and conscientiously their own work and that of others.

(10) *Educational content is emphasized.* We still worship brawn, but in our more thoughtful moments it is clear to us that the "brain" should be the master of our muscles. In the

project method, the effort is made to bring out the maximum educational value that can be obtained from work-centered activities. Well-selected questions are used to stimulate reflective thinking. Short, but frequent, checking is done to see that practice actually makes perfect—and the checking is done in so far as is feasible—by the pupils. Pupils are encouraged to ask questions of one another, which is quite foreign to the more conservative teaching techniques. Pupils are encouraged to support their view-points, as long as they are sincere about it, against others, even those of the teacher. Such a thing is quite unheard of in the secondary schools of certain other countries. In many countries pupils would never think of differing with their instructor except in regard to a point of fact—and then with great caution. But we believe in encouraging independence of thought and of expression and hold that such habits need to be cultivated early in order that creative thinking may be more common in adulthood. Learning, in a social setting, is a give-and-take affair.

8. Factors in selecting projects. In practice there is considerable variation in how school projects are selected. First, there are those who have a prescribed list of projects which are to be completed in the order in which they are listed by the teacher. This order is *supposed* to be based on learning difficulties, and is intended to present experiences involving the various tool operations and principles that are to be mastered. It is claimed that this method of approach saves much floundering on the part of pupils who do not know what they want; that it makes reasonably certain that essential things are learned; and that the instructor can foresee, definitely, the kinds and quantities of materials that will be needed by the class. It is furthermore claimed by the supporters of this plan that it forestalls possible ill feeling over the selection of projects—that pupils will not ask to undertake projects beyond their abilities.

On the negative side, it may be mentioned that this plan violates some of the most important concepts of the project method of teaching. It does not stimulate pupil purposing nor pupil planning except in so far as details may be concerned. If everyone of six brothers in a family is *required* to make a

bread-board, a foot-stool, and a glove box, may it be that mother will hardly know how to show her appreciation by putting them all to use in the home? It is quite certain that most pupils would be more interested in their work if they had a share in determining what they are to make.

Second, come the adherents of the theory that pupils should select the projects they undertake. They favor free selection on the part of pupils. It is their conviction that everyone works most whole-heartedly and energetically when he, himself, determines what is to be done. If he succeeds, it gives him an added thrill; if he fails, he has himself to blame—so they reason. Knowing that he chooses a given project, he is more likely to see it through to completion than he would otherwise. Others hold that this plan needs modification—that there are matters in which youth needs guidance and that experience has shown that it is unwise to expect pupils of junior, or even of senior high school age, to select and carry to completion major units of work without guidance.

There are others who favor a plan which is a compromise between the two extremes just mentioned. Third, then, is a plan which favors pupil purposing, planning, and “doing” under teacher guidance. Pupils may be encouraged to select one of several projects that contain approximately equivalent educational values. They may, if they like, suggest other projects that are suitable, but they are led to see that there are certain abilities that need to be mastered, and that projects, from the school point of view, are definite means of learning. Accordingly, projects may not be selected in a random sort of way. Pupils have, or can develop, the capacity to associate satisfaction with experiences that are necessary, and so the instructor, through proper presentation and motivation, may guide pupil effort along helpful lines without sacrificing opportunities for developing the learners in directions that are demanded by the American pattern of life.

9. **Criteria for project selection.** Just as the preparation of written assignments is of major importance to those features of the Dalton and the Winnetka plans that are set apart as constants which all are expected to master, so, likewise, is it impor-

tant to the success of the project method that each project be selected with considerable care. Toward that end the following criteria may be suggestive.

(1) *The project should be timely.* There are definite relationships between the seasons of the year and current community interests and those of pupils. Boys are most interested in undertaking projects that relate directly to their play, avocational, or vocational interest. Other things being equal, boys are most interested in making bows and arrows, kites, boats, and the like when they can use them. The interest in making Christmas toys for the poor, or for those confined to beds of sickness, is during the Christmas season when, in many parts of the world, nearly everyone catches the spirit of good will which Jesus exemplified so beautifully some nineteen hundred years ago. Girls are most interested in projects in the realm of homemaking when they contemplate marriage and when they are homemakers. They are often given instruction in clothing before training in foods because teen-age girls are likely to be more interested in clothing than in food at that period of development. So projects should be selected with due regard to timeliness from several points of view. They should mesh, first of all, with dominant inner urges or drives and, second, with environmental conditions, such as the season of the year or prevailing community interests.

(2) *It should be interesting to the pupil.* The values of pupil interest in what he undertakes have been mentioned in connection with previous discussions. Pupil interest is something that has received hearty lip service from teachers, but to put this idea into practice is a problem of magnitude. So at the risk of unnecessary repetition, let it be recorded that an essential characteristic of projects is that they are interesting to the point of calling forth zeal and effort. Many projects can be made interesting by presenting them in such a way that the appeal is made to strong behavior tendencies or emotional drives. Class spirit, school loyalty, the good will of persons held in esteem, the approval of parents and teachers, and desired forms of recognition, such as are given in scouting and to Future Craftsmen, illustrate what is meant.

Projects are often made more interesting through "related in-

lems" are largely manual, just as there are many projects that call largely for motor skills. It is also clear that real problems should lie at the root of school projects. Indeed one of the most vitalizing features of practical arts and vocational education is that they utilize actual life problems. Little is likely to be gained by trying to differentiate arbitrarily between the project and the problem method of teaching. Instead of arguing the point it would be better to make sure that projects and other learning units center around problems that are really vital and that are significant toward individual development and growth. It is better to think of problem-solving procedures as having wide application rather than to think of a problem method of teaching.

11. **The Contract Method.** Another form of large-unit assignments is the so-called *Contract Method*. It may be regarded as a modification of the Dalton Plan. A number of vocational schools and departments have their assignments divided into *contracts*. The term appeals to persons soon to seek employment in industry or in business, where "contracts" are common. Some of the girls' trade schools have used large-unit assignments called "contracts" effectively for years. The chief difference between these contracts and those employed under the Dalton Plan appears to be the fact that in the trade schools the units of work are selected for their value as trade-preparatory or pre-employment training whereas the Dalton Plan started, and is commonly associated with, programs of general, non-vocational education. In girls' trade schools, where the pupils must be self-supporting in relatively short periods of time, as from three months to two years, the contracts are, of necessity, closely related to vocational competence and very little time may be given to socialized education on a group basis, as is common with the Dalton and the Winnetka plans.

Contracts are also used with boys in vocational schools. They may deal with any kind of assignments, the chief purpose of which is to do something according to certain standards as expressed or implied in the "contract." Contracts are also used for purposes of industrial arts education. The chief purposes of contracts may vary from general educational objectives to try-out,

exploration, and guidance, as in practical arts education, and to definite vocational education, which is broad and comprehensive when time is available, and narrow and highly specialized in instances where the broader education is not practical.

Among the objectives of the contract plan is to develop the right spirit or attitude toward schoolwork—to get the learners to appreciate that school assignments are specific means toward greater ability and fuller living vocationally, socially, and ethically.

Yager illustrates how the Contract Plan can be applied to instruction in elementary electricity.* He used the plan to stimulate interest and to make the instruction realistic. The pupils are asked to think of themselves as "electrical contractors." Groups may adopt firm names, such as "James and Decore, Electrical Contractors." Each group of "contractors" is asked to submit bids for installing specified electrical appliances or wiring systems in the skeleton frame bouse in the school shop. The boys must estimate the amount and cost of the materials and labor involved and are required to submit bids, as is standard practice in the building trades. Many times these bids are typed on standard forms such as contractors use. The successful bidders become the supervisors or the foremen on that job. All material is issued in accordance with the provisions of the accepted bids and the work is carried out according to the working drawings made by the successful bidders. The "carry-over" of these procedures into life situations is believed to be relatively high.

PRACTICAL SUGGESTIONS FOR TEACHING

On the basis of the preceding discussion let us look for a few of the truths or view-points that are most likely to be of value for better teaching.

1. The fundamental idea back of all of the large-unit assignment plans discussed in this chapter is to bring about *growth through self-activity*.

2. Units of work, no matter by what name they may go, are

*Sylvan A. Yager, "The Contract Plan Applied to the Teaching of Elementary Electricity," *Industrial Education Magazine*, 36:52-3, January, 1934.

a succession of related experiences organized around a central idea or theme.⁷

3. It is generally agreed that neither the project method, the Contract Plan, the Dalton Plan, nor any other plan is best under all conditions. Each has its advantages and its limitations. Variation and adaptation of methods to individuals and to situations are imperative.

4. Teaching by the project method is not something that needs justification. Of 213 articles dealing with large-unit assignments, which were listed in the *Readers' Guide* during the period 1916-1930, more than half bore captions of "project teaching."⁸

5. The aim is to so arrange units of work that one unit leads to successive ones in natural and needed ways.

6. Full, free, and spontaneous pupil participation is an ideal toward which progress is best made, step-by-step—a certain amount of guidance is usually necessary.

FOR DISCUSSION

1 Compare the Dalton with the Winnetka Plan of teaching.

2 In what way does the Eureka Plan differ from those mentioned in the preceding item?

3 Mention six rather essential concepts related to the project method of teaching.

4 What criteria are valid for purposes of determining the selection of projects?

5 Explain "Not all shop projects are taught through the project method."

6. What are some of William H. Kilpatrick's views on the project method?

7 How was the term "project" introduced in education?

8 By whom should school projects be planned?

9. Give suggestions as to how projects may be evaluated for educational purposes.

10 Frederick C. Bonser has suggested three ways of selecting and arranging projects. What are they? (See the *Elementary School Curriculum*, Chapter VI, pp 90-2)

11. Describe the Contract Method of teaching as it is used in a school with which you are familiar

12 Distinguish, if you can, between a "job sheet" and a "contract."

13 Describe one or more difficulties or limitations of large-unit assignments

14. Describe and evaluate the Dalton Plan, or a modification of it, as now in operation in a public school.

⁷ Robert Hulf Lane, "The Activity Program and Its Teaching Methods," *Education*, Vol 57, No 6, February, 1937, p 324

⁸ Roy O. Billett, "Plans Characterized by the Unit Assignment," *School Review*, XL 653-68, November, 1932

15. What is a "home project"? In connection with what phase of education is it most commonly conducted?
16. Compare the educational contributions of individual projects with group projects.
17. What steps has Kilpatrick suggested as being essential to the project method?
18. Evaluate the project method for your field of major interest.
19. Write out, and be prepared to compare, several definitions of "project method."
20. Give examples showing where the project method can be used to advantage and where it cannot be employed effectively.

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Individualized instruction is a reaction against unjustifiable uniformity, against the lock-step procedure, against the wastefulness of daily lesson hearing and of enervating uniform exercises for pupils of varying abilities. But individualized instruction is not a panacea, not a cure-all. Poor teaching by any method is still poor teaching. Instruction may be good or bad in either group or individualized education. When instruction is properly individualized it gives every pupil the opportunity for wholesome development and growth along suitable lines, up to the limits of his capacity.

2. The right spirit versus a pre-conceived plan. Whereas it is true that certain plans of teaching—such as the Dalton, Winnetka, and Contract plans—provide for individual instruction, it is rather clear that what is most essential are the right spirit and attitude toward individualized teaching on the part of teachers, coupled with understanding and suitable methods of procedure. The basic idea is not that of trying to teach according to some pre-conceived plan but so as to bring about maximum individual growth. To this end the creation of the right kind of classroom or school shop atmosphere and sympathetic understanding on the part of the teacher are values of the first magnitude. By right attitude is meant that view-point which puts the learner above strict adherence to previously planned procedures—the belief that individual differences deserve to be recognized, even to the extent of reversing, if need be, the customary way of doing things.

But it should not be inferred that pre-planning and the development of socially desirable attitudes are necessarily in conflict. Long-time planning is very essential. The point at issue is that such planning must not be used to make either robots or servile imitators. Pupils are potentially creative workers. The task of teaching implies responsibilities for developing resourcefulness in learners, and this cannot be done by sticking slavishly to pre-conceived plans of what should be done. Let there be room for individual differences and for utilizing unlooked-for situations.

3. The psychological basis for individualized instruction. No matter how carefully a group of pupils may be selected on such a basis as intelligence, mental age, or mechanical aptitude, there

still remain fundamental individual differences. These variations may be mental: for intelligence tests do not adequately measure all forms of mental ability; they may be emotional: for emotionality is exceedingly complex, and present tests are but approximate means of measurement; the differences may be volitional—variations in capacity to will to do things; and finally, these individual differences may be physical in nature. In addition to these four groups of difference, there are also variations in attitudes, ethical concepts, and moral standards. And since each individual differs from all other individuals in such respects, there is little wonder that educators have turned to individualized instruction as *one* of various ways that are utilized in progressive education to adapt the work to individual needs.

4. How to handle individual differences in the shop. There are many ways in which resourceful teachers modify assignments to meet individual differences. Only a few of these will be mentioned here.

(1) *Varying the amount of work.* All pupils can be held to their best efforts by a frank recognition of the fact that some should be expected to do more than others. In other words, each should be held for assignments according to his capacities. A few should be held only for the specified minimum. Others should do more. Still others should be held for the maximum amount of work that can be done satisfactorily.

An easy and satisfactory way of modifying the amount of work according to ability is to encourage all pupils to work as fast as is consistent with the quality to be achieved. While some pupils complete two projects, others will finish three or four of similar difficulty. Once the ability of a pupil is known, his assignments can be made in accordance with it.

(2) *Varying the difficulty of the work.* When schoolwork is assigned on an individualized basis, it is a relatively easy matter to vary the difficulty of the work to meet the requirements of individuals. Every shop teacher has, or should have, many sketches, blue-prints, and instruction sheets of various kinds upon which he may readily draw. All shop teachers should know the sources to which pupils may be referred so that their capacities for learning may be used to advantage. In woodworking some

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pupils might be encouraged to do their project in a relatively soft wood that is easy to work, whereas others, more capable, might well undertake a similar project in a more beautiful cabinet wood, like walnut, which is harder to manipulate. In wood finishing some should use finishes that are easy to apply; others should be encouraged to attempt something requiring greater skill of execution.

(3) *Varying the nature of the work.* Assignments may be made that will take into account a number of factors, such as personal interest, amount of previous experience, and learning difficulties. For good reasons, distinct departures from the usual assignments can be made to advantage. It is especially desirable to vary the form of exercises or projects that need to be "repeated." Instead of asking a pupil to do over the same exercise or project one or more times, would it not be better to call for *other* exercises or projects which contain the same or closely similar demands upon skills, insights, or knowledge?

(4) *Varying the sequence of the units of instruction.* Prospective teachers soon learn that in many school shops it would be impossible to require all pupils to follow the same order or sequence of tool and machine operations. Some pupils must be started on bench-work and others on machines because of the nature of the equipment available. And even the power tools cannot always—or even frequently—be learned in a given order. Nor is it at all certain that such a theoretically logical sequence of operations is desirable if it could be arranged. One tool or machine may be more difficult to master than another. There are cases where that appears to be so, but the differences in skills required often depend more upon the *degree* of accuracy, or the "limits" demanded, than upon anything else. But there are other reasons for varying the normal sequence of instruction. For example, it may well be the usual procedure for the instructor to require pupils in the shop to make shop sketches or to prepare (with the cooperation of other teachers and departments) scale drawings of objects that are to be made. In a few cases, however, pupils who have unusual difficulty in visualization and in sketching or drawing to scale may learn to overcome this weakness in ability to visualize if they are encouraged to make projects

similar to some that can be shown them objectively. Then, after this, they can be asked to sketch or draw such objects. This procedure is obviously "irregular," and no doubt faulty for the normal pupil, but it works effectively with certain "problem" cases.

(5) *Varying the routine assignments.* Individual differences in interests and capacities can be discovered through try-out and exploratory experiences. It is consequently desirable to rotate the various forms of learning experiences—both routine and other—that come within the range of teaching opportunities. In accordance with this principle, the instructor will see to it that each individual has approximately equal opportunity to test out his liking and capacities for the total range of learning units. This will include manipulative work, experience in cooperation or team-work, managerial responsibilities, and those calling for initiative and other desirable social traits. No pupil should be permitted to do any one thing, such as taking charge of tools or of supplies, too long. Each should have the benefits of whatever exploratory or other learning value there is in a given unit of work, without monopolization or exploitation.

One fundamental purpose in varying assignments is that each learner shall be led to think as much as possible. In practical arts and vocational education discriminating thinking is needed fully as much as manipulative skill. The goal is to combine them wisely. In making assignments the progressive instructor seeks to make them thought provoking and meaningful.

5. Individual instruction may be social in nature. So much has been said and written about the socializing values of group instruction that there are those who think that individual instruction, by way of contrast, must be seriously lacking in this respect. A little reflection will show that this is not even a half truth. Although instruction that is individualized throughout deprives the learner of certain advantages that grow out of group participation, it is clear that individual instruction *may* be directed so as to stimulate effort that can have far-reaching social value. The farmer who tills his fields alone often has a more social outlook upon life than the factory worker who is working on the endless belt in an assembly plant; the craftsman who

works as an individual producer may see the social implications of his labors; and the teacher who handles pupils on an individualized basis has the opportunity and the obligation to guide and direct his learners so that selfish motives will broaden into socially approved goals. Sound, democratically conceived industrial arts and trade or industrial education cannot escape responsibility for socializing individual instruction.

To some there appear to be two conflicting ideals in education. They see a conflict between education as a means of self-realization and education for the larger social group. As a matter of fact, the leading educational opinion is to the contrary. Dewey and other eminent philosophers of education hold that the best interests of the individual and those of the larger group coincide.

6. Some desirable characteristics of individual instruction. Individual instruction is usually given when, for one reason or another, group instruction is not feasible. It is used to good advantage to supplement group instruction. Among the characteristics of good individual teaching the following deserve to be mentioned:

(1) The *individual differences* of the pupil should serve as points of departure for individual instruction. The purpose is to use such differences by employing methods that will utilize them to advantage.

(2) The *personality traits* of learners should be diagnosed and used toward educational growth. Some pupils are timid and lack self-confidence. This fear can be overcome through friendliness and through encouragement. Others are over-confident; they think that their work is better than it is. This attitude may be changed by patiently guiding such pupils to make careful comparisons between their own work and that of others, by the use of objective rating scales, and through carefully judged competitions.

(3) The *previous background* of education and experience should be recognized in good individual instruction. According to this principle, assignments must be determined with due recognition of what the pupil already knows and can do.

(4) Good individual instruction seeks to *integrate* experiences,

knowledge, and appreciations into units instead of exposing the individual to too many vaguely related elements of learning.

(5) Good individual instruction has *order, sequence, and continuity*. It must be planned and has to be checked for achievement. In individual instruction adequate drill is sometimes overlooked, and the instructor may forget just what each member of the class was taught unless he has satisfactory ways of keeping records of the points or units covered.

(6) Good individual instruction is *challenging, thought-provoking, and educative*. The progressive teacher distinguishes between memorization and analytical thinking; between mere habit formation and creative effort.

7. Difficulties of individualized instruction. It is well to recognize that every form of instruction has its limits and that individual instruction is no exception to this. It is conceivable that individual teaching may foster rugged individualism—that it may promote the attitude of everyone for himself as long as the action is not contrary to the letter of the law. It is also possible that individual instruction may be too indoctrinational—that it will result in imposing upon the learner the personal view-points and beliefs of the teacher beyond the bounds of desirability. Still another danger lies in the fact that individual instruction does not offer the same opportunities for frank and many sided discussion. So learning of this type may be somewhat less thorough and less broad. But none of these objections is insurmountable. They need to be recognized in order that they may be overcome in one way or another. For example, the lack of group instruction may be overcome to an appreciable extent through extensive observation, collateral reading, and supplemental study.

One of the most common objections to individual instruction comes from persons who claim that it is expensive. It is not to be denied that the per pupil hour cost of individual instruction is higher than that of group teaching. But the way to look upon it is to determine whether or not the higher cost is warranted by social and economic factors. To illustrate: Is it cheaper to give part-time or evening instruction on an individual basis to unemployed adults than to support them at public expense? Is it cheaper to provide special individualized teaching to youths who

lack adequate general education, try-out or exploratory experiences, or vocational competence, or is it less expensive to society in the end to let them drift?

8. Instruction sheets as aids. At this point it may be well to refer to what was said in Chapters II and III about instruction sheets as devices that can be of much help to teachers in many forms of individualized instruction. It was concluded that instruction sheets are definitely helpful in that they conserve the time of the instructor—particularly in individual instruction. It was also mentioned that Henig has suggested that instruction sheets can be adapted to individual differences by providing for three levels of accomplishment.

The major contribution to the literature available to date on instruction sheets has been made by Selvidge.¹ He has called attention to the fact, pertinent at this point, that instruction sheets are indispensable in schools or classes where attendance is irregular, as it often is in part-time and evening schools and in large classes. Written instruction sheets have the advantage that they are thought through better than impromptu oral instruction; they may be written simply, and effectively, and they are likely to be more accurate than oral instruction.

Selvidge takes the point of view that job analysis is necessary as a basis for preparing instruction sheets but that a job or trade analysis in and of itself does not constitute satisfactory instructional material. "An analysis on the job basis gives us only the *convenient units of production*, while an analysis based upon the operations and items of information of the trade gives us *convenient units of instruction*."²

Different types of instruction require different kinds of instruction sheets—such as assignment, information, operation, and job sheets—and they likewise require different procedures according to the various conditions of use. Indeed, instruction sheets may take such unconventional forms as the manufacturer's manual that is issued by automobile manufacturers to service stations. These manuals are used extensively by teachers of

¹ R. W. Selvidge, *Individual Instruction Sheets*, Peoria, Ill., The Manual Arts Press, 1928.

² *Ibid.*, pp. 16-21.

automobile mechanics. The operations are listed in proper sequence and are explained so that they can be followed. To be sure, such operation or job sheets may need to be supplemented by other written material or by oral instruction.

Suggestions for using instruction sheets for individual instruction under classroom conditions are made by Albrecht of the Essex County Vocational Schools, New Jersey.³ His suggestions are substantially these: (1) While the class is being seated and during the time that the roll is being taken, a pupil who has charge of the folders in which each pupil's work is kept distributes the work. (2) Each pupil reads the objectives of his unit of work as it is stated in the lesson sheet. (3) The pupil secures the necessary reference material, such as textbook or reference books, catalogs or blue-prints. (4) He pursues his lesson and, upon completion, places his name on the blackboard as an indication that he is ready to be examined in it. (5) The lesson sheet is returned to the boy who has charge of them.

While pupils are studying these lessons the instructor supervises the work and gives such help as he thinks is advisable. Five minutes before the close of the study period, each pupil places his work in a folder bearing his name. These folders are then filed as indicated in the preceding paragraph. Some of the possible disadvantages of instruction sheets, and how to overcome them, have been given by Willoughby.⁴ His plan is to develop "work-units" which follow this general form:

1. *Title*

2. *Your Job*

A brief statement of what is to be done.

3. *General Directions*

These call attention to the various steps in studying, planning, and executing the work.

4. *Specifications and Suggestions*

Here the descriptions are given or suggestions are made as to how the work is to be done.

³Henry H. Albrecht, "Using Instruction-Sheets in the Classroom," *Industrial Education Magazine*, Vol. 34, No. 1, July, 1932, p. 11.

⁴George A. Willoughby, "Instruction Sheets in Shop Work," *Industrial Education Magazine*, Vol. 31, No. 12, June, 1930, p. 453. (Used by special permission of the Manual Arts Press.)

5. Study Assignments

These cover study which is undertaken before the project is undertaken

6. Students' Plan Sheet



FIG. 30. Showing how welding is taught in the aviation ground school conducted at the Burgard Vocational High School, Buffalo, New York.

The pupil indicates his plan step by step, lists materials and tools to be used, and is given the opportunity to make suggestions for the improvement of the specifications.

9. Trade information. An interesting form of instruction is described by Hurr and Miller.³ The plan is one that has been developed (in the form described) at Dunwoody Industrial Institute, Minneapolis. It calls for a period of 45 minutes a day during which all students are required to get "shop knowledge" or related trade information. At the time the article was written lesson material was prepared on 55 different topics. Mimeographed outlines, in bound form, are used. Each lesson calls for:

- | | |
|--|---|
| 1. A subject introduction. | 5. A list of reference charts, slides, |
| 2. A lesson outline. | models, samples, and so on, available for use with each lesson. |
| 3. A quiz sheet. | |
| 4. A "master" question and answer sheet. | |

The following list of topics which have been prepared for this study is suggestive of the nature of the content of this "related information."

Abrasives	Heat Conductivity and Expansion
Bakelite	Centrifugal Force
Builder's Hardware	Types of Bearings
Fire Protection and Apparatus	Printing-Press Rollers
Alloys and Alloy Steels	Power Transmission
Workmen's Compensation Law	Care and Use of Explosives
Lubricants and Lubrication	Methods of Forming Metals
Copyrights	Patternmaking
Humidity	Coremaking
	Molding

Trade journals, handbooks, catalogs, manuals of instruction, and other trade literature are studied.

10. The case method. As an aid in individual diagnosis and for purposes of individualizing instruction, it is desirable to understand case-study techniques. Each pupil should be looked upon as an individual differing in certain respects from all others. The emphasis is on the individual, not on a group. The instructor using case-study techniques is more interested in some respects in traits that are exceptional than those that are typical of pupils.

³L. L. Hurr, and E. R. Miller, "Teaching Trade Information," *Industrial Education Magazine*, Vol. 33, No. 2, July, 1931, pp. 40-1. (Used by special permission of the Manual Arts Press)

Sperle holds that, whereas individual differences have long been recognized, it was not until more effective methods of testing, recording, and utilizing facts of variations were discovered that the knowledge of the existence of such differences was of appreciable value. She contends that the change of emphasis on the individual calls for a modified concept of the role of the teacher. If pupils are to have a share in purposing and planning, it is clear that the instructor cannot be a task-master in the traditional or old-time sense.*

The following outline for case analysis has been proposed by Douglas Waples:⁷

1. Define the case.
2. Analyze the case.
3. Interpret the case.
4. Collect solutions.
5. Define conclusions.

The case method has long been used in law, medicine, engineering, and elsewhere. Speaking of this method from the standpoint of its application to the training of lawyers, Dean Young B. Smith of the Columbia University Law School says that law is developing so fast that the case method is no longer adequate. We quote: "Undue emphasis was placed upon the rules of law developed by the cases, and too little consideration was given to the economic, political, and social problems which had brought the rules into being."⁸

In industrial arts and trade or industrial education, there is also the danger that too much emphasis will be placed upon specific cases. The writer is of the opinion that we need to look for the unusual in individuals, and we must attempt to diagnose each individual, but we must not attempt to generalize or to develop basic principles on a few cases. There are said to be exceptions to most rules. The case method is but one of several techniques at the disposal of the progressive teacher.

11. Problem-solving. It is quite obvious that the technique of problem-solving is one that applies to group as well as to indi-

*D. Henryetta Sperle, *The Case Method Technique in Professional Training*, New York, Teachers College, Columbia University, 1933, p. 22.

⁷Douglas Waples, *Problems in Classroom Method*, Preface, New York, The Macmillan Co., 1927.

⁸Young B. Smith, "The Case Method of Legal Questions," *School and Society*, Vol. 27, May 5, 1923, pp. 521-6.

vidual instruction. It is discussed at this point because of its possible contributions to teaching that is conducted on an individual basis. Psychologically a problem represents some felt need or difficulty that is experienced by an individual or a group of persons.

Burton has made a careful analysis of the problem-solving technique as developed in American textbooks on general method.* In view of the need for discriminating thinking and problem-solving in these fast-moving times, this matter is one that needs to be tackled in a resolute way. The roots of the problem-solving technique as a phase of education go back to antiquity. Socrates employed a problem-solving method. Comenius, Locke, Rousseau, and Pestalozzi followed with more advanced procedures.

Coming to our own generation, we find James, Thorndike, Dewey, Parker, Kilpatrick, and many others. In his discussion of this topic Burton shows how Herbartian methodology stressed "speculative interest" which has points in common with modern problem-solving technique. The "Developmental Method" of the Herbartians, including the well-known five steps in teaching—preparation, presentation, comparison, generalization, and application—dominated educational method for about a quarter of a century. He also points out how John Dewey, in 1895, in a paper read before the Herbart Society, showed the weakness of the Herbartian theory, which had no place for instincts and emotions and which, being "directive and authoritative," did not encourage the development of individual initiative and resourcefulness on the part of the learner.

Dewey has analyzed problem-solving into these five steps:

1. A felt difficulty or need.
2. Analysis and location of the difficulty.
3. Suggestions for possible solutions.
4. Development by reasoning of the implications and bearings of what was suggested.
5. Further observation and sometimes experimentation which lead to acceptance or rejection.

These steps are illustrated in the following example: (1) The

* William H. Burton, "The Problem-Solving Technique," *Educational Method* Vol. XIV, January, February, March, 1933, pp. 189-95; 248-53; 338-42.

felt need or problem in this case is how to make a simple bed-side stand. (2) The second step consists in guiding the pupil in deciding upon the nature of this stand. Will it be of modernistic design or is it to harmonize with period furniture and, if so, of what style, kind of wood, and finish? At this point supplemental study to broaden the pupil's insight and knowledge may be advisable. Trade catalogs, reference books on furniture, magazines featuring furniture design, and others, such as *Industrial Arts and Vocational Education*, may be studied. (3) As a basis of the study just mentioned the pupil is now ready to make suggestions concerning this problem. He is prepared to make a shop sketch or perhaps a scale drawing. He will work out a list of material to be used and estimate its cost. He will consider the tools to be employed and make a list of them if the teacher thinks it worth while. (4) In this step he thinks through the work to be done. He tries to anticipate all possible circumstances that may arise, and he weighs the advantages and disadvantages of each operation or way of doing things. To illustrate: Will he use a butt joint or some other type? Will he use nails, screws, bolts, glue, or other fasteners in the various places? What advantages and what disadvantages are there in using the various forms of finish that could be employed? These and many similar points are subjected to discriminating thinking. In "practical" projects, such as the one under consideration, the actual doing of the work and the thought processes or problem-solving go hand in hand. Some aspects of the problem do not become evident until the work is in hand. For example, a knot or other imperfection in the material becomes an element in the problem when it is discovered—not when the paper plans are made. (5) The final approval or rejection of the plan or of parts of it is the last step that Dewey mentions. No matter how carefully plans are made, unlooked-for circumstances or new ideas may lead to modifications during the progress of the work. In this case, even though it is a very simple job, the pupil will want to give final approval or rejection to each feature before it is carried out. In teaching pupils to solve their own problems the instructor should guide them so that they will learn to sense the various possibilities that may take place. For example, if ply-wood is to be used, will

it stand up under moisture? Will it give a sufficient grip to nails where they are driven between the layers of ply-wood?

Many so-called "problems" are scarcely that, if a problem is defined as a situation involving a *felt need*. Too many school "problems" are artificial and lack the interest that comes from relation to the life of the pupil. The instructor can help materially in making problems interesting and worth while to pupils. Proper motivation is one method of doing this. Problems can also be made more interesting and more educative by organizing them around central topics and by going a step further, which is to organize them into larger units of learning.

12. How problem-solving is taught. It is generally recognized that pupils can be taught how to solve problems and that age, maturity, and other individual differences call for different methods and varied procedures. Among these are: learning through trial and error; learning through imitation; using hints and suggestions; employing analytical thinking.

(1) *Through trial and error*. This is the most primitive form of problem-solving. It is also the most wasteful and inefficient method at man's disposal. But in spite of the fact that this is well known, one can find plenty of cases, in industry and business as well as in schools, where learners resort to this method of approach.

(2) *Imitation*. Learning through watching others do it is very common in the practical arts. It is not to be denied that imitation is of value—particularly when judgment is used in what is imitated. Much that is worth while is learned that way, and many times it is the most efficient form of learning. But we must not close our eyes to the fact that originality is at a premium, and that in school shopwork there is entirely too much imitation. Slavish adherence to the plans and designs of others is all too common. More originality is needed.

(3) *Hints and suggestions*. Good teaching often consists of giving the pupil a hint as to how to attack his problem; of advancing a mere suggestion which will serve as a thought-provoking aid. This is undoubtedly better teaching than trying to do all a pupil's thinking for him. Instead of giving direct answers to questions directed at him, the instructor may well pause to

quired to glaze a window pane 24 inches by 30 inches in size? Such judgments are formed rather gradually, and pupils can be taught to refine successive ones by close observation and repeated attempts in judging combined with comparison with the facts.

(3) *Judgments of relationships.* These are of many kinds. In "practical" work it is often a matter of the relation of the part to the whole. In other instances it is a relation of cause and effect. In still other instances it is a matter of judgment of relationships between production and marketing or between wages, conditions of employment, and living conditions. Good teaching seeks to develop capacities in each individual to make reasonably sound decisions in many matters involving relationships.

(4) *Judgments concerning time and speed.* The automobile industry with its 30 million or more American licensed cars, the air-plane industry with its speedy birds of the air, and the railroads with their new-type fast trains all serve to remind us that judgments involving time and speed are very necessary in our daily lives. And there are many other demands for similar judgment. High-pressure production methods in mills, factories, and workshops call for the same kinds of judgments. We dare no longer ignore these demands. They can be developed, bit by bit, through learning situations that call for close observation of time and speed relationships. The boy in the print shop must master his timing in operating the press; in welding, time and speed are essential factors. In fact every phase of industrial arts and trade education presents opportunities for developing such judgments.

(5) *Judgments involving socio-economic values.* Industrial arts particularly, and trade education possibly to a somewhat less extent, aim to develop insights and judgment of contemporary socio-economic situations. Such a problem as whether or not to affiliate with one labor, economic, or political group, or others, is a matter calling for judgment such as is best developed through years of education plus experience. As the social structure becomes increasingly complex, the need for incorporating specific education for developing socio-economic judgments will become apparent. One way of doing this is to encourage impartial discussion of vital life problems. Whether the instruction be indi-

work even though the hours are relatively short. Furthermore, most pupils will do better work when they work at a good speed. The schools cannot afford to develop habits of loitering or time-killing in youth.

(3) *Use self-explanatory instruction sheets.* The various forms of instruction sheets that are used, such as assignment, operation, job, and information sheets, should be clear and self-explanatory. This is not to be interpreted as meaning that they should be so detailed as to exclude opportunities for proper self-activity on the part of the learner. On the contrary, it is important to have this material in such form that it will develop related study, problem-solving abilities, and good study habits. This is achieved in part through suitable references and through challenging questions which can be incorporated in these lesson sheets.

(4) *Use objective rating scales.* In a sheetmetal shop several rating scales can take the form of series of sheetmetal projects which have been arranged in an order of quality from poor to superior. In the electric shop various forms of splices and different kinds of electric hook-ups and pupil-made electric devices, such as small motors, semaphores, telegraph instruments, magnets, and the like, can likewise be arranged in such an order. In the drafting room drawings can be arranged so as to serve as a rating scale. In woodworking, various joints or projects, depending here as in other cases upon the stage of development of the pupil, can be arranged in order of quality. In every phase of the work it is possible to develop objective rating scales. Pupils can be taught to grade their own work by the aid of such scales. Experience appears to indicate that they can do this quite as well as the instructors.

(5) *Use objective tests and examinations.* This refers to various forms of new-type tests which will be discussed in a subsequent chapter. By objective tests are meant tests that are so constructed that any competent examiner will give the same score to the test, and the same instructor or pupil will give the same score at different times. This is not true of the old essay type of examination. The new-type tests include true-false, multiple choice, comparison, completion, and other forms.

(6) *Have available suitable reference material.* At the expense of repetition let it be said that, for the different forms of shop and laboratory instruction, it is very helpful to have relatively small and yet adequate reference libraries in the shop or laboratory, or, perhaps better, in an adjoining study and planning room rather than in the central school library, which may be on another floor of the building. Many forms of this reference material are highly specialized and would not be wanted by pupils in other departments. Among such, are trade catalogs, instruction manuals put out by manufacturers, sample materials furnished by dealers, and illustrative objects collected for instructional purposes.

(7) *Use work-books.* Gradually work-books are being published. So far the major development has been in the "required subjects." But they are also appearing for practical arts and vocational education. A work-book may be described as a book designed for individual work on the part of a pupil. Such books contain material quite similar to what others may arrange in the form of separate instruction sheets.

(8) *Use graphical job or project cards.* By using record cards of a graphical nature which each pupil can keep up-to-date, it becomes easy for him and for his instructor to see at a glance just what has been accomplished and where his instruction needs to be amplified. Some system of filing such cards so that they are always readily available will be helpful.

(9) *Develop graphical summary records.* In addition to the individual project record card just mentioned, the teacher will want summary records for each individual. Such a record is particularly useful in that it indicates at all times how far each individual has progressed.

(10) *Make reports to parents that mean something.* It is particularly desirable that reports made to parents be more instructive than the traditional type of report which gives standings merely in terms of a percentage, or of a system of letters, such as A, B, C, D, and F. What the parents want to know about is *individual growth*, individual points of strength and weakness, and relative standing as compared with others. Prospective em-

ployers are interested in this same kind of information. They have learned that a grade of A or B does not mean much without additional information.

PRACTICAL SUGGESTIONS FOR TEACHING

And by way of conclusion, what are some of the points that relate rather definitely to teaching? A few suggestions follow.

1. Individualized instruction need not lack socializing values.
2. Individual instruction is neither superior nor inferior to group instruction as such. Each form is best under certain circumstances. Each may well supplement the other.
3. Individual instruction is particularly valuable for those who cannot attend class regularly. It is the chief method in many forms of part-time and evening instruction.
4. Individual instruction can be improved in effectiveness by using instruction sheets, objective self-administered tests, self-rating scales, and graphical self-kept progress records.
5. Wherever possible individual instruction should be supplemented by supplemental reading and group contacts in order to provide the broadening and socializing influences that might otherwise be missed.

FOR DISCUSSION

1. What are the chief advantages claimed for individualized instruction? Disadvantages?
2. Explain how instruction is individualized in your field of major interest.
3. What practical ways are there for varying the quantity and the quality of the work to meet individual needs in your realm of chief interest?
4. Describe how individual instruction may be given so as to have socializing values.
5. Evaluate instruction sheets from the standpoint of your field of special interest.
6. Will environment greatly influence a pupil's intelligence? His social outlook?
7. Compare the tendency toward undue indoctrination in individual, as compared to group, instruction.
8. Show how instruction sheets can be employed so that they will have a more personal appeal than is usually the case.
9. How may one determine the relative effectiveness of individual as compared with group instruction?
10. Give concrete examples illustrating circumstances under which, or for which, individual instruction is superior to group teaching.

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CHAPTER XV

OTHER LEARNING TECHNIQUES

DEMONSTRATION, RECITATION, AND SAFETY EDUCATION PROCEDURES

1. The demonstration. Among the methods of teaching, the procedure of showing the learner how to do something is used extensively in practical arts and vocational education. But the demonstration, properly conducted, is not quite so simple as that. Among the advantages of the demonstration as a means and method of teaching are these: The method is objective and concrete. Visual and other sense perception come to the aid of the sense of hearing, which brings the explanatory statements that accompany the demonstration. Another advantage is that the method is adaptable to greatly varying circumstances. It may be used for individual instruction as well as for group teaching; it can readily be employed in unison with other techniques. The method is one that has universal appeal. It ranks high in rapport or the satisfaction that it gives to pupils. In a demonstration something happens that is observable and usually understandable. This appeals to learners of all ages.

The demonstration helps to clear up what might otherwise be vague and even meaningless—particularly for pupils who are not strong in mental or abstract visualization and for those who have language handicaps. The demonstration employs a universal language—it is better than Esperanto.

Psychologically, there is the effect of seeing that the thing can be done. This eliminates doubts and strengthens the will and determination to duplicate, or possibly to improve upon, the procedure. Educationally there are advantages in combining theory and practice closely. When a demonstration is given at the time that the act, operation, or process is being discussed, the result is better than when an appreciable amount of time

elapses between the thought and its execution. From this standpoint the demonstrations that are given in the shop or laboratory, by the shop teacher, at the time that the "iron is hot" are more valuable than the same demonstrations given later in a different setting. There are three logical steps in a "practical" demonstration. They are: preparation, "putting it over," and clinching the results.

2. Preparation. In preparing for one or more demonstrations attention needs to be centered upon having on hand all the material, tools, or equipment that will be needed. It is poor practice to begin a demonstration and find something missing when the demonstration is under way. If the demonstration is of a nature to require it, a check-list may be used to advantage to make sure that everything is on hand that needs to be there. Of course simple demonstrations need little, or no, special preparation on the part of the teacher.

In making preparations it is well to remember that it is ordinarily good practice to use the same kinds of materials and quality of tools that the pupils are expected to use. This helps the pupils to develop confidence that the task can be done with the materials and tools at *their* disposal. When a teacher employs the same tools that the pupils are to use, he settles once and for all the question of whether or not the tools or the materials lend themselves to the job demanded of them. The *condition* of the tools as well as of the materials may have much to do with the success or failure of the work that is to be done. Some materials of the hard-to-get type may need to be ordered long in advance, and in other instances certain processing, such as the drying of lumber, also is a matter for pre-planning.

One reason why beginners have difficulty in doing certain kinds of work according to a workman-like standard is because someone is laboring under the delusion that cheap tools and materials will serve the purpose. Even an expert finds it difficult to do satisfactory work with sub-standard tools and materials.

3. "Putting it over." There are several factors that enter into performing a demonstration with success. The first that will be mentioned is the *setting*. It should be as natural and as true to life situations as possible. Unless the pupils happen to be in a

demonstration amphitheater, or in special seats arranged before a demonstration bench or table, let them sit or stand as they please, informally and naturally, during the demonstration. But for the sake of giving all a good opportunity to see what is going on, provide ample open space around the demonstrator.

It is good practice to let the pupils know in advance what is going to happen. They should be looking for the essential things that the demonstration is designed to teach. Under such circumstances they will look for more, see more, and learn more than they would otherwise. Counter attractions, such as "fooling," "wise-cracking," someone's effort to "show off," or other distracting features, should be eliminated. Such behavior should be regarded in its true light as acts that interfere with the effectiveness of instruction. They are not acts that concern the particular pupil and the teacher alone but rather forms of conduct that are to the disadvantage of the whole group.

Having properly motivated the demonstration, and with the group in readiness to learn, the instructor will demonstrate the first step. He may pause at this point to check up on whether or not everyone fully understands what has happened and how it was done. Before proceeding it may even be wise to let someone of the group perform that same step. This step will be followed by the second one and the third and so on until the demonstration is complete. Just how much to include in each step, how many steps are to be used, and how much checking is to take place during the demonstration are matters of judgment. Much will depend upon the maturity of the group and the nature of the demonstration. Most beginning teachers, if they err, will do so on the side of making the steps too long and of not checking sufficiently as they proceed. A demonstration is no better than its weakest link.

No matter how skillfully or how perfectly the demonstration may have been performed as judged from the angle of craftsmanship, it is a success educationally only to the extent that the pupils have learned what they were expected to learn. So, in a very real and practical sort of way, demonstrating is more than merely showing. It's the results that count.

In "putting on" a demonstration of the doing type, the best

procedure for each step should be taught. If there are alternate methods that are almost as good, or that are better under certain conditions, it is often, though not always, best to demonstrate them at another time, as that is less confusing. In general it is better to master one thing at a time.

Another important aspect of "putting over" a demonstration is to make clear *why* as well as *how* and *when*. To illustrate: a given tool, such as a draw-knife, is sometimes used with the flat side against the working surface, and at other times with the beveled side toward it. Unless the pupils know why this is done it should be explained or, as a first approach, the instructor may raise the question with the hope that some pupil may be able to give the right response.

4. Clinching the result. The first word of the caption of this paragraph was selected deliberately. As many know, a nail that is driven straight into lumber will hold a reasonable amount. But when the end is clinched it is there to stay. And so it is with the demonstration technique. The closing essential step in the demonstration is to clinch what has been taught. This is done best by giving the pupils the opportunity, then and there, to duplicate the habit formation involved. Clinching the demonstration consists in giving each pupil the opportunity to do what was demonstrated, and in supervising this activity to make certain that variations of the best demonstrated practice do not occur.

5. Should pupils give demonstrations? There are many schools where beginning and more advanced pupils work side-by-side in the shops, drafting rooms, and science laboratories. In a fair proportion of the cases the beginners serve as assistants or helpers to the more advanced pupils. When this is true it is reasonably certain that they are demonstrating many things to those helpers. It is claimed by many who have had experience with such teaching plans that it works successfully. There are certain obvious advantages in such a plan. Pupils can sometimes learn more readily from one another than from the teacher. A possible hazard in this procedure is that pupils may teach each other faulty ways of working.

There are other instances where teachers call upon their more

able pupils to demonstrate processes. Pupils usually feel honored to be called upon in that way, and the others are doubly interested to see one of their own number perform.

It is reasonable to conclude that, whether or not pupils are to be encouraged to give demonstrations to individuals or to the group as a whole, is a matter that should be left to the judgment of the teacher and his supervisor.

6. **Teaching through illustration.** To illustrate means to make clear or intelligible by means of figures, comparisons, graphs, or pictures. Illustrations are used because they serve as aids in teaching. There are many instances when sketches, pictures, or other representations of objects are more understandable than the objects the sketches represent. For example, illustrations can be made of parts of objects that are usually hidden from sight. In other instances illustrations to a reduced scale, like maps, are very helpful. The opposite procedure of using illustrations, namely, those that increase the scale of an object—like an enlarged drawing of the crystalline structure of a metal—are equally conducive to clearness of understanding.

That illustrations are educative is scarcely debatable; that they are studied with unusual interest is proved through their use in the press and through the greatly increased use of motion pictures for instructional as well as entertainment purposes.

We are beginning to learn to use illustrations in teaching in the way they deserve to be used. School districts are today going to considerable expense to provide the facilities needed to do this. The scientific studies that have been made during the last decade or two have helped to prove to us that most learning takes place through the eyes. Progressive teachers are looking toward using illustrations more than formerly.

As a means of teaching by illustration, the school blackboard ranks first. In school shops and drafting rooms drawing papers of several kinds hold a prominent place. In classrooms, shops, and auditoriums the different kinds of projectors, such as those for glass slides, film slides, opaque projection, motion pictures, and pictures with sound accompaniment, are used with increasing effectiveness.

It is desirable to use illustrations whenever a sketch, a graph,

a drawing, or a picture will best help the pupils to understand more readily what they are trying to master. Illustrations may be used to advantage *before, during, and after* discussion and shop periods.

Since pictorial illustrations and the various forms of conventionalized mechanical and architectural drafting speak a uni-



FIG. 32. Safety education at the East High School, Kansas City, Missouri. Notice the Danger Zone lines painted on the floor, the jointer guard in position, the hands held away from the cutter, the body well balanced to prevent slipping.

versal language, it will be seen that in the practical arts it is distinctly worth while for persons to be able to express themselves through illustrations. Consequently, pupils should be encouraged to develop such abilities.

Photographs and other illustrative material can be used as study aids. Much of such material can be indexed and filed and can be used as is other reference material.

7. The nature of appreciation. It has been recognized for some years that the emotions play a large part in human behavior. It is known that elemental emotions often hinder learning, and, conversely, that properly directed emotions are a strong source

of inner urge for effective learning. Appreciation is largely an emotional response. It is not without elements of knowledge. Knowledge often deepens and enriches appreciation. But individuals can have intelligence without possessing a normal ability to appreciate. In these days of wide-spread social, economic, and political unrest it is easy to observe how strong a part the emotions play in our behavior.

Appreciation is largely a matter of feeling, and feeling is related to experience. Education, which is designed to guide experience, can also guide emotional growth and the development of appreciations.

Appreciation is involved in a recognition of values. It colors thinking and together with intelligence helps to determine values. Through the coordination of emotions and intellect it is possible to associate satisfaction with experiences that would otherwise be dull and uninteresting, and to associate dissatisfaction with life situations that are anti-social.

8. Teaching appreciation. It is generally recognized that appreciation cannot be taught satisfactorily through compulsion. The most helpful and constructive emotional patterns are not the result of dictatorial teaching. Appreciation develops best through feelings of freedom, happiness, and interest. Appreciation does not come through unwelcome drill but through pleasurable learning experiences.

It can be seen, therefore, that to teach appreciations requires techniques that are very different from those that the old-fashioned schoolmaster commonly exemplified. It seems clear that the teacher can best teach appreciation of what he himself values deeply. Not that this will assure success, but it is one of the helpful conditions. The spontaneous enthusiasm that people display for such forms of experience as working with tools and enjoying art, literature, music, and the drama and for the sports is in part emotional and appreciational and is contagious.

In teaching for appreciational growth it is pertinent to recognize that individuals differ in emotional capacity just as they do in motor, volitional, and intellectual capacity. Consequently one must not expect to develop the same degree of appreciation in all pupils. Furthermore, emotional development is not uniform.

It is affected by many things and is *more responsive to informal than to formal procedures*.

Emotional patterns develop over a period of years and quite unconsciously. Social and aesthetic appreciation comes in part through extended experience. Appreciation is possible beyond the realm of one's ability to do. For example, it is possible to appreciate fine art without being an artist, or practical arts without being an expert craftsman. Of course appreciations may be deepened and broadened through actual participation but this does not necessarily follow.

The techniques of developing appreciations are so complex that much must be left to the resourcefulness of the teacher. Opportunities for expressing appreciations should be provided. Attitudes and ideals which involve appreciations can be strengthened through expression. Pupils can be taught to look for the worth while and the beautiful—to be alert to harmony in color, contour, texture, and the like. They can be taught to see unbounded beauty in common things and worth in people of all walks of life.

9. **Techniques in conducting recitation or discussion groups.** The word "recitation" needs to be replaced with a more modern term. It is used here because it is the word that is in most common use to designate forms of instruction of the group type, where text and reference materials are the basis of the work. But by "recitation," as here employed, is not meant mere lesson hearing and topical re-citing, which are out of accord with modern educational beliefs. The present-day "recitation" has become a democratized and socialized group instructional procedure, in which many teaching devices are employed. It is a form of instruction that stresses pupil participation and pupil initiative under teacher guidance. No complete set of directions can be drawn up that will cover all the various problems that arise in actual practice, but the points that will now be presented may be helpful:

(1) **Orient the instruction.** In beginning the "recitation" bring out the relationship of the preceding lesson or lessons which ties in with the work in hand. This may be done in a number of different ways; through questions or through suggestive statements

by the instructor. This should take but little time. It helps to motivate the work and serves to strengthen previous learning.

(2) *Develop a natural setting.* This is done by avoiding formalizing procedures. Encourage pupil activity. Try to get everyone in the group to participate voluntarily. Unless the pupils have had such experience previously, it is to be expected that the teacher's success in this will be a matter of repeated trials. So much "academic" instruction in the past has been given under the older concept of teacher domination that pupils must be taught how to participate on their own initiative.

(3) *Stimulate discriminating thinking.* The recitation should be more than merely a series of statements secured from the assigned readings. It should bring out beliefs and view-points held by different members of the class; it should call for *evaluating* what others have said or written; and it should result in developing in pupils the ability to think carefully and analytically. Good questioning technique on the part of the teacher will function effectively toward such outcomes.

(4) *Guide the development of expression.* Under the older concepts of the recitation—concepts that are far from eradicated from practice—pupils were largely in the habit of answering questions in short responses. It is much better to teach pupils to develop ability in clear, logical, and sustained oral discussion. Such ability usually comes through extended effort, covering a relatively long period of time. Sympathetic understanding and encouragement by the instructor are quite certain to lead to improvement. Through the teacher's wise handling of oral expression, pupils learn considerateness in debate and resourcefulness while on their feet.

(5) *Develop adaptability.* Progress through discussion takes place best when everyone is open-minded and willing to modify his own thinking on the basis of facts. In democratically guided class discussion, pupils learn to adjust their convictions as a result of what others have to say. The inferences that one pupil draws from reading the assigned lesson may be modified as a result of the amplifying discussion that takes place in the "recitation" period. Adaptability on the part of the teacher as well as the pupils finds expression through using unexpected situations

have better than average opportunities to make significant contributions in this direction.

Good habits of work imply far more than mere diligent activity or mere mechanical or technical perfection. The manipulative activity must not be divorced from its social and economic setting. *Good work habits are those that are actually useful in attaining that which is worth while.* So they imply the coordination of reflective thinking, of emotional sensitiveness, of volitional effort, and of muscular activity.

Experience points to the conclusion that it is highly desirable to cultivate good work habits in pupils long before they finish the secondary schools. A large proportion of those who graduate from high school will be called upon to perform work that is largely of the doing type. The need for right habit formation for such kinds of work is self-evident.

(2) *Self-control.* It is rare to find a great leader who has not learned self-control. Superior men, says Burnham, share in human emotions and usually have a larger share than the average. But they seldom, except perhaps rarely when under great stress, suffer greatly from abnormal inhibitions and artificial repressions of feelings. He finds also that great men seldom, if ever, succumb to abnormal emotion, such as fear.¹ Industrial and business leaders expect self-control from their employees. It is necessary to success in the world of work and to happiness in the home and the community. That being true, is it not a by-product that is worth what it costs to develop it? Right methods of teaching will help to develop self-control.

(3) *Education in scientific method.* As one of the conclusions of his study of great teachers since the days of Socrates, Burnham says: "The whole of modern science shows that for real knowledge nothing is so important as the scientific attitude and method and the control of one's personal emotional equation."² It is commonly recognized that the scientific method is not limited to statistical techniques and to objective and quantitative measurements. "So long," says Phillips, "as there is an honest effort to secure all the facts possible, to apply them to man's

¹ William H. Burnham, *Great Teachers and Mental Health*, New York, D Appleton and Co., 1926, p. 251.

² *Ibid.*, p. 337.

needs, and as long as love of truth means more than victory, the procedure is praiseworthy as being scientific."³

In the realm of the physical sciences such steps as these are used in scientific method:⁴

- (1) Recognition of a problem needing solution.
- (2) Making a "best" guess (based on such related knowledge and experience as one may have, or be able to get, as to how the problem may be solved).
- (3) Putting the "best guess" into practice.
- (4) Modifying the "best guess" or theory, if necessary, on the basis of the practice.
- (5) Continuing to modify each successive theory on the basis of each successive, more refined test until the refined theory has been proved correct.
- (6) Putting the theory into practical use or making it known so that others may do so. (Many scientific discoveries were put into practice many years later.)

11. The need for safety education. In the more restricted sense, the purpose of safety education is to educate individuals to avoid accidents to themselves and to prevent them to others. But accident prevention is only one aspect of safety education. To quote the National Safety Council, "It means more than accident prevention—it means the conservation of all that goes to make life worthwhile—health, opportunity, and the material resources upon which life itself depends."⁵

To refer for a moment to the general accident situation: During the year 1936 accidents in the United States caused 111,000 fatalities, in excess of 10,000,000 disabling injuries, and an economic loss that is estimated in the neighborhood of \$3,750,000,000. Accidents sustained in occupational pursuits account for 18,000 deaths, 1,530,000 injuries, and an economic loss of about \$660,000,000.⁶

carried on chiefly in the elementary school, where it has met with success far beyond expectations. It has also been conducted with reasonably good success by teachers of practical arts and vocational education. Studies that have been made by Cressman, Henig, Judy, and others indicate that there are untapped opportunities and responsibilities for safety education in industrial courses.

In 1934 Cressman undertook a study which had as its purposes: to reduce accidents in school shops; to produce safety-conscious workers; to emphasize specific social responsibilities; to contribute to more accurate accident reporting; and to make recommendations for safety education programs.⁷ This study was based upon 1041 accident injury reports received from 153 school districts in one year. More than 76 per cent of the injuries were cuts. First-aid was given in the shop in 1001 out of 1041 cases. In 929 of the cases reporting, the pupil himself was responsible for the accident.

The number of accidents in wood shops were higher than in metal shops, and considerably higher than in automobile and electrical shops. The study shows that the number of accidents decrease relatively the longer the school shop training. Evidence was found that crowded, inadequately equipped, improperly lighted, and poorly kept shops add unduly to the toll of accidents.

In Iowa, 252 industrial arts teachers reported 724 accidents which required medical treatment in one year. Of these 552 were caused by hand tools, and 156 by power-driven machinery. The service of physicians was employed in 113 of these cases.⁸

12. The safety engineer. Some shop teachers appoint, or elect, a safety engineer, foreman, or inspector. Among the duties this pupil performs, Billings lists these:⁹ He checks on neckties to see that loose flowing ones do not endanger the wearer. Similarly, sleeves, aprons, and other apparel are checked. Pupils are checked on the use of goggles—many persons dislike to use them when

⁷ P. L. Cressman, *Safety Education in Pennsylvania School Shops*, Doctoral Dissertation, The Pennsylvania State College, 1934.

⁸ Wayne C. Judy, "Accidents and Safety Education," *Industrial Arts and Vocational Education*, 22:267-9, September, 1933.

⁹ Curtis Billings, "Making the School Shop Safe," *Industrial Arts and Vocational Education*, 22:377-9, December, 1933.

they should. Guards, belts, tool rests, and gas or other furnaces, come under his surveillance. He looks for tools that are out of place—especially on the floor where they are hazards—for mushroomed tools, oily waste that has been misplaced, and for other fire hazards. It is his duty to check the first-aid cabinet, to see that running machinery is not left alone, and that "horse-play" is prevented.

Sometimes such duties are left to a committee of two or more pupils. Usually their period of service is limited so that many or all pupils will have the chance to secure this experience.

13. **Safety education through visual aids.** It is generally believed that the most effective way to teach safety in school shops and laboratories is to practice safety and teach it through demonstration when the shop or laboratory is in operation. However, visual aids can be used to good advantage to supplement such demonstrations. For this purpose safety posters are one of the devices that have long been used. For many years the National Safety Council has made these available to members. The schools often have them made in art departments. Prizes, or recognition of some sort, are frequently given to the best-designed posters.

Charts of many kinds are also effective. Sometimes they show graphically the accident record in competing departments in school or in industrial establishments.

"Self-made" slides, in which crayon or ink is used on etched glass, and slides made with white or colored Cellophane are made readily and inexpensively by pupils. Such slides can supplement many excellent ones that can be borrowed from museums and commercial concerns or that can be purchased from dealers in visual-sensory aids.

Motion pictures are well suited to bring out points on safety. Other visual-sensory aids that apply to safety education are discussed in Chapter X.

14. **Positive versus negative safety instruction.** There are differences of opinion concerning the relative merits of teaching safety through negative, as well as positive, avenues of approach. In industry as well as in schools one can find "don'ts." A list compiled by Flaherty, which appeared in a popular professional

magazine, will serve to illustrate what is meant.¹⁰ This list serves as a good check-list of items that should be covered in safety instruction for electrical students.

That the negative or "do not" approach to safety education is not without advantages is brought out by an experimental study by Vaughn.¹¹ His conclusions tend to show:

- (1) Verbal instruction unsupported by other forms of stimulation is relatively ineffective, especially with children.
- (2) The effects of warnings and threats are transient, especially with children.
- (3) Demonstrations of the manner in which injury may take place have more effect on behavior than mere positive or negative directions.
- (4) Actual experience of the ill effects of wrong reactions is most effective.
- (5) Drastic threats of punishment may occasionally inhibit desired behavior.
- (6) Detailed instruction in either positive or negative forms tends to increase desirable responses and decrease undesirable responses.
- (7) Negative instruction shows a slight superiority over positive instruction in reducing undesirable responses.

15. Analyzing specific needs for safety education. Safety education in industrial classes is desirable from standpoints other than those that have been mentioned. The school shops are well suited for safety education that relates to shop activities. Teachers are more patient, will take more time, and are better teachers than most foremen in industry. The school, furthermore, is a good place in which to develop safety consciousness and safety attitudes and ideals.

Beyond and above the general safety practices that apply to most school shops and to many occupational pursuits, there is the need to study the specific safety requirements for each type of school activity. An illustration of the results of such a specific

¹⁰ Edward B. Fisherty, "Don'ts for the Electrical Shop," *Industrial Arts and Vocational Education*, 23 132-3, March, 1934.

¹¹ James Vaughn, *Positive versus Negative Instruction*. Doctor's Dissertation, University of Chicago. (New York, National Bureau of Casualty and Surety Underwriters), Vol. II, 1928, p. 172. Quoted from Stack, *op. cit.* (Used by special permission of the National Conservation Bureau)

safety analysis is reported by Karch.¹² What he has done for the print shop is suggestive of what others have done, and will do, in other areas of instruction.

Of course the protection and conservation of the human resources are vastly more important than any monetary values that can be placed upon accident prevention. But to show that the economic aspect is not to be overlooked, reference is here made to an article by Heron, who cites court cases that were expensive to the school districts involved.¹³

16. Safety signs and slogans. Men in industry, and teachers too, disagree about the value of signs and slogans as teaching aids in safety education. Representative of those who place little faith in danger signs is Grove who has developed a list of precautions relating to the operation of millroom machinery.¹⁴ His procedure is to hand the list of suggestions and precautions to the beginners in machine operation. Although the article does not say so, it is probably fair to judge that supplementary instruction is given.

The causes of accidents listed in Henig's study, to which reference has been made, are arranged on the basis of school departments, such as "automobile" and "drafting." Suggestions relating to the use of tools and machines are also classified by him in the same helpful manner. Among original safety slogans listed by Henig are these:¹⁵

"A live wire may mean a dead man."

"Carefulness makes for happiness."

"Keep safety in mind and trouble behind."

"Safety is clever; accidents never."

"Use care everywhere."

"Safety takes the dent out of accident."

Some schools have made very attractive signs and slogans out of durable materials, such as aluminum, sheetmetals, and cast

¹² R. Randolph Karch, "Accidents and Health Hazards," *Industrial Arts and Vocational Education*, 24:295-6; 335-6, October, November, 1935.

¹³ Percy H. Heron, "Every Job Can Be Done Safely," *Industrial Arts and Vocational Education*, 24:249-52, September, 1935.

¹⁴ J. G. Grove, "Safety Precautions in the Millroom," *Industrial Arts and Vocational Education*, 25:375-7, December, 1936.

¹⁵ Max Henig, *Safety Education in The Vocational School*, 1928, p. 60. (Used by special permission of the publisher, The National Conservation Bureau.)

iron or steel. Others are made in the form of blue-prints, printed signs, and original ink drawings.

17. **Advantages of a safety concept.** Various means and techniques of instruction, such as demonstrations, illustrations, suggestions, directions, posters, and slogans, no doubt have value in teaching safety habits and in giving safety information. But if



FIG. 33. This high school student has been taught how to operate the universal saw safely. Notice how he is using the "push stick" with his right hand. The guard is in place and he is paying strict attention to his work.

safety education through school instruction is to achieve its goals, teachers will need to go beyond these procedures.

Safety is a matter of heart and understanding. Underlying methods of approach, there must first of all be a respect for, and an appreciation of, the rights and the welfare of others. Not that the various means and methods are not good, but more progress will be made when right attitudes and ideals are at the foundation of what is done.

Attitudes and ideals are the result of the fusion of emotional responses and of the intellect. Thinking and knowledge are appreciable factors in safety attitudes. Grinstead suggests that teachers study the nature of safety hazards, that they classify

them as to the probability of occurrence, and take steps to reduce their happening to the minimum.¹⁸ Hazards, he says, should be studied from three angles, namely (1) that of the operator, (2) that of the machine, and (3) that of the material that is used.

An understanding of the physical limitations of persons, machines, tools, and materials will give a good basis for accident prevention. A taxi driver who had a long record of safe driving to his credit said his achievement was due to a large extent to his driving with the assumption that other drivers are likely to do the thing that is unexpected. He was prepared for possible accidents.

18. Management and safety. In an earlier chapter reference was made to the relationship between school discipline and effective learning. Proper conduct in the school shop is just as much a condition of safety as it is of learning. It is good practice to develop the resourcefulness of pupils in every proper way, but it is doubtful procedure to leave a school shop in charge of a member of the class when dangerous power-driven machinery is in motion. It is perhaps equally questionable practice to delegate safety instruction to a pupil.

Accidents sometimes occur because material is not properly stored. Under school conditions the vertical storage of lumber and steel offers greater hazards than horizontal storage. Projects in the process of construction can be stored more safely in suitable space that is within easy reach than from a ladder, a chair, or a saw-horse.

Floor space that is kept free of shavings, cuttings, oil, and other things that may cause individuals to slip or fall is another safety factor.

When benches, machinery, or equipment are placed with insufficient workroom or without suitable aisles, accidents are likely to increase proportionately.

Proper illumination—both natural and artificial—is not to be overlooked when seeking to reduce accident hazards.

Cooperation with representatives of the State Department of Labor and Industry, or whatever department has charge of fac-

¹⁸ Noel B. Grinstead, "Building a Safety Concept," *Industrial Arts and Vocational Education*, 26:12-13, January, 1937.

tory inspection, is desirable as a check that school safety provisions are up to standard.

19. Parental permit to operate machinery. A device used by some schools is to provide each pupil with a card similar to the following one, which is used in Kansas City, Missouri. On the

Hr..... Date..... 19.....

.....has my consent
to operate the following power machine in the.....

.....High School (Wood) (Metal) Shop, under
supervision of the teacher in charge.

Please cross out the name of any machine you do not wish your child to operate.

WOOD SHOP

Lathe	Circular Saw
Shaper	Band Saw
Jig Saw	Grinder
Jointer	Hand Router
Mortising Machine	Surfacer

METAL SHOP

Lathe	Milling Machine
Drill Press	Welding Torch
Shaper	Furnace
Grinder	Forge

.....
Parent or Guardian

A 25c shop fee must accompany this permit.

(Front of Card)

SAFETY PLEDGE

I hereby promise most sincerely to observe all safety rules set up in this shop. Furthermore, I will try to protect others from hazard and accidents and if necessary call the attention of the instructor to any violation of the safety rules.

Signed

(Back of Card)

face of the card the parent or guardian indicates his attitude toward letting the pupil operate hazardous machinery. The back of the card is reserved for a safety pledge which is made by the pupil. The chief value in both is to help the pupil to realize that safety practice is very necessary.

The following suggestions in teaching safety were likewise developed in Kansas City, Missouri:

Objective:

To encourage the formation of safe working habits as well as an emotional attitude such that safety may become an ideal as well as a habit.

Content and Pupil Activities:

Discussion of shop hazards and different types of accidents that might happen in shop.

Expression of opinion as to the cause of accidents and how they may be avoided.

Discussion of the need for safety rules for use of machines and tools and of the value of thorough understanding of how machines and tools are operated.

Discussion of value of right emotional attitude toward use of tools and machines.

Teaching Suggestions:

Demonstrate operation of machines and list safety rules for each. (Bring out necessity of obtaining instructor's permission before using machines.)

Demonstrate proper use of chisels, hand saws, planes, screw drivers, wrench, knives, dividers, and other pointed and sharp tools, pointing out hazards of incorrect uses of each.

Demonstrate proper use of hammer, mallet, and other driving tools.

Demonstrate correct methods of handling lumber.

Explain miscellaneous hazards of shop, such as accidents resulting from careless handling of tools, scuffling or other horseplay, or careless handling of materials.

Appointment of a committee in each class to study the needs of the shop and make suggestions for accident prevention.

Evidences of Desirable Progress:

Careful handling of tools and machines and the development of an attitude toward safety (a safety consciousness) that functions favorably in keeping them free from mishaps.

20. **Accident procedure.** The recommended procedure in case of accidents that come under the jurisdiction of boards of education varies somewhat. Much depends upon the availability of trained medical aid. In some instances teachers are given strict instructions that they are not to give first-aid treatment except of the most minor sort—that all cases should be sent to the school nurse or doctor. In other instances such trained help is not available. The extent to which the shop teacher should give first-aid is no doubt debatable.

The procedure to be followed in case anyone is injured, or for any reason needs medical aid, should be understood by all teachers. As a means of guidance in this matter, the following suggestions are offered:¹⁷

TABLE X

SUGGESTED PROCEDURES IN SHOP ACCIDENTS

- (1) Give first aid.
- (2) Call hospital or doctor, or send to school nurse or doctor.
- (3) Notify parents by telephone or in person.
- (4) Discuss hospital or doctor arrangements with parents—or have principal or director do so
- (5) Notify proper local and state school authorities.
- (6) See that the machinery, tools, or materials involved in the accident are left untouched until after a proper inspection has been made.
- (7) Report accidents on the forms required by the school district and the state.

PRACTICAL SUGGESTIONS FOR TEACHING

Finally, what are some of the points brought out in this chapter that relate significantly to teaching? The following ones are selected for emphasis.

1. Demonstration as a technique in teaching means more than merely showing how something is done.

2. Appreciation is largely a matter of feeling. In a sense it is "caught rather than taught."

3. The word "recitation" no longer means re-citing and lesson-hearing, but group instruction that emphasizes pupil activity, pupil initiating, and pupil resourcefulness.

4. One of the purposes in teaching safety in the schools is to make everyone safety conscious.

¹⁷ Adapted from P. L. Cressman, *op. cit.* (Used by special permission of the author.)

5. Underlying the teaching of safety techniques there must be a safety concept, an attitude of mind and an ideal.

6. Safety education as taught in the schools is far from being narrowly utilitarian. Its chief object is the conservation of human life.

FOR DISCUSSION

1. Should teachers encourage pupils to give class demonstrations? Explain.
2. Describe what you believe to be a good setting for a practical shop demonstration.
3. Give a specific example illustrating the essential steps in a class demonstration.
4. How are appreciations developed?
5. Why do we need a new word or phrase to replace the term "recitation"?
6. Why is it desirable to bring out the relationships that exist between various learnings?
7. Give a concrete example showing how learnings may be related.
8. In what ways will safety education in industrial classes affect highway safety?
9. How long should a pupil serve as safety engineer in the school shop or laboratory?
10. Compare the effectiveness of safety posters of the "shock" type with those of the informational type.
11. Discuss the legal value of the parental permit to let a son operate hazardous machinery.
12. Under what conditions is a teacher legally liable for accidents in his shop or laboratory?
13. Explain concretely how pupils are taught to serve as safety engineer.
14. What is the state law relative to the use of guards on hazardous machines?
15. Mention the most common sources of accidents in the shop or laboratory with which you are most familiar.
16. To whom are teachers required to make reports of school accidents? How is this done?
17. Write out and present for discussion a list of safety suggestions for a school shop or laboratory.

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CHAPTER XVI

ASSIGNMENTS, DRILLS, AND REVIEWS

THE NATURE AND FUNCTION OF EACH IN TEACHING

A. THE ASSIGNMENT

1. The significance of the assignment. The term "assignment" as used in American schools refers to the allotment or designation of work to be done by pupils. Educationally the assignment is of greater importance than is commonly realized. As far as organized school instruction is concerned, the assignment is the starting point in guiding learning.

With the increased emphasis that is being placed upon attitudes in learning, and upon the prime importance of interest, it is seen that the assignment can, and should, become the means of a right start.

The desire to learn is more important than are methods of teaching. Where there is a will, the way will be found. But where there is indifference to learning, no method will be effective. *The pupil's attitude toward learning is more important than well-organized courses of instruction.* It is precisely for these reasons that the assignment is educationally important. Through it the teacher has the opportunity to so influence pupil attitude that effective learning will result. "Mental-set" is recognized as vital to learning; interest is crucial to educational achievement. The assignment is the means of arousing interest and of bringing mind-set into action.

2. The Assignment in relation to individual differences. The existence of individual differences and their extent are well understood. The important thing is to do something about it. The assignment provides this opening. The teacher can modify the assignment in amount, quality, difficulty, and sequence. It can be given so as to take into account personality traits, previous

education, capacity, and other factors that must be considered in fitting work to individual requirements.

There are other differences which are due to local conditions that may likewise serve as guide-posts in making assignments. There are differences not only between individuals within the same class but also between schools and communities that must be taken into account—differences in resources, equipment, public opinion, occupational opportunities, and the like.

3. **Types of assignments.** Many years ago Earhart called attention to the fact that the assignment does not prepare for book study only.¹ This will seem quite obvious to teachers of practical arts and vocational education, who have long used assignments in the form of sketches, drawings, blue-prints, specifications, and instruction sheets of several kinds. A more recent writer, who incidentally has written very helpfully on the assignment, finds that "few writers have made any serious effort to classify assignments."² Yoakam believes the classification of "old-type" and "new-type" to be a more valid one than Waples' classification of textbook, topical, and cooperative assignment. Under "old-type" Yoakam lists assignments made on the basis of page, paragraph, topic, chapter, question, exercise, experiment, and theme.

In contrast with this he lists the following types as "new-type": the problem, unit, job sheet, guide sheet, goal book, project, contract, term syllabus, and intermediate assignment. He makes it clear that there is more or less overlapping between these terms.

Apparently the list of old-type assignments was made out without reference to the practical arts, for projects and instruction sheets, which in some form have long been used, were not mentioned in that classification. But in spite of this, Yoakam's classification has a good deal of merit. His old-type list is characterized by types that depend largely upon memorization of factual material, whereas his new-type form of assignments stress the development of original thinking and of more carefully directed learning. Such a distinction is very much to the point.

In fairness, it should also be said that Yoakam has clearly

¹ Lida B. Earhart, *Types of Teaching*, Boston, Houghton Mifflin Co., 1915, p. 80.

² Gerald A. Yoakam, *The Improvement of the Assignment*, New York, The Macmillan Co., 1933.

brought out the advantages and disadvantages of both types of assignments, and he has made it clear that page, paragraph, or chapter assignments may be satisfactory at times—if well made by a teacher who understands human nature and the learning process.

4. **Essential characteristics of a good assignment.** As a basis for improving assignments let us consider the more important elements that go to make up a good assignment. To this end the following characteristics are suggested:

(1) *The assignment should be related to previous learning.* The old, familiar principle of starting with what is known and proceeding from there to the unknown—using “appereception” as a foundation—is involved here. At the beginning of the course of study a pre-test is frequently desirable in order to find out what each pupil knows. Let it be said parenthetically, or between the lines, that the results of such pre-tests may be low in reliability for several reasons, not the least of which is that every pupil may not have tried equally hard to do his best on the test. In so far as possible, “previous learning” should take into account all life experiences, whether acquired in or out of school, that relate to the unit of instruction.

(2) *Definiteness and clearness are crucial.* An assignment is definite when it indicates precisely and accurately what is to be done, when it is to be done, how it is to be done, and how well it is to be done. An assignment can be very definite without being clear. It is essential to express the assignment in terms that are clearly understood by the learner. What is quite clear to one may be hazy or even unintelligible to another because of difference in language or other ability. Sometimes the teacher employs words that have technical meanings with which some pupils are unfamiliar. Another source of misunderstanding comes from expressing ideas in a general or abstract way rather than in specific and concrete form. What seems clear and definite to the teacher who is very familiar with what is being considered may be confusing to a large part of his class—and the tragedy of it is that all too frequently no one tells the instructor this.

(3) *A good assignment indicates sources.* It is good practice to make the assignment so that the pupil will not waste time

hunting for the reference works mentioned, for the materials to be used, and for tools that are to be employed.

Naturally the goals that are to be achieved have much to do with the way an assignment is made. Let us illustrate this by taking the example of an assignment calling for collateral reading. Several experimental studies indicate that in general extensive reading is superior to intensive; that extensive reading is better than reading half as much material twice; and that intensive reading is better when the purpose is to reproduce something—such as a shop project described on a job sheet.³

It is true that with the more mature students the teacher may be justified in giving less detailed or specific sources. The theory is that the student should develop ability in finding sources, in judging between the valuable and the mediocre, and in evaluating the worth-whileness of what he reads in terms of his particular needs.

(4) *The assignment should stimulate interest.* Time and again reference has been made in this book to the importance of stimulating interest and of developing a favorable learning attitude. There is rather general agreement that a well-made assignment calls into play emotional, intellectual, and other mastery responses so that the problem or the job will be begun with zeal. In practical arts and vocational education the doing element has a strong appeal. Interest is destroyed by too much talking. A good way to develop interest in shopwork is to demonstrate or illustrate what is to be done and let the pupils go ahead as soon as they clearly understand this. From time to time motivation may be advisable. The nature of the work and other circumstances, such as the amount of repetition involved, will be factors that will help to determine that. Interest is also developed by appealing to desirable forms of rivalry, by showing the application of what is to be done, and by calling attention to the advantages in doing it. Praise, where deserved, is likewise helpful in developing and strengthening interest.

(5) *The assignment should guide learning.* An assignment may be so detailed that it requires little more than ability to do as one is told. It may also be so general that it is at best a

³ *Ibid.*, pp. 249-50.

In mathematics and science, such home assignments should be problems that are to be worked out according to a method that was explained; in drawing, the problems can call for improvement through practice; and in general education, for collateral reading that will supplement school instruction.

5. When to make the assignment. The time to make the assignment is not a matter of hard and fast rule. Sometimes it is necessary to make it near the outset of the instruction period, as when the teacher meets the pupil or the class for the first time. Making the assignment at the beginning of the period of work has the advantage that the pupils are inclined to give better attention than they will if the assignment is made a few moments before the close of the period. The assignment is also made less hurriedly at this time.

In contrast with this, the chief advantage in making the assignment at the close of the period of group instruction is that it enables the teacher to adapt the assignment to the progress that was made during the period. If the assignment for the next lesson or unit of accomplishment is made at the outset of the period of work, the teacher cannot be certain that it will be completed as planned.

When the assignments are made in the form of projects to be completed, problems to be solved, or units of work to be done on an individual basis, the assignments are made whenever the preceding project or unit of work has been completed.

A mistake that is made commonly is to wait until the last few minutes of a class period to make the assignment. At that time the pupils are more interested in what they will do during the free interim than in a hurriedly made assignment. In the light of the educational importance of the assignment, we can be sure that it is of the utmost importance to make assignments in an unhurried manner.

6. Motivating through the assignment. In Chapter VI of this book motivation was defined as "stimulating individuals to educative activities." Attention was also directed toward the chief sources of motives that can be used in developing whole-hearted learning effort. In order to motivate instruction, the instructor must be able to appeal to such behavior tendencies as curiosity,

interest, exploration, the desire to achieve, the impulse to want to make or construct, and the urge to solve problems. The procedures for doing this depend greatly upon circumstances. It is clear that real interest and enthusiasm on the teacher's part, coupled with ability on his part to *emotionalize* the assignment, are at the root of skill in making assignments effectively. By emotionalizing is meant the ability to appeal to the feelings as contrasted to purely intellectual appeal, which sometimes leaves pupils cold or untouched.

Written words have less appeal than those that are spoken with feeling. This is one reason why instruction sheets need to be supplemented by the teacher. Instruction sheets can be made interesting, but the human voice is capable of emphasis and appeal that are difficult to convey through the printed page. Written assignments need to be motivated fully as much as those made orally.

7. Questions that motivate. In Chapter III of this book several types of questions were listed and the technique of questioning was discussed. It is our purpose at this time to give several illustrations of questions that have value as devices to stimulate interest in assigning lessons.

(1) *The factual question.* In its simplest form this type of question calls for facts. These may have been secured through rote memorization or through more thoughtful learning. Several examples follow:

- a. In what proportion should cement, sand, and gravel be mixed for sidewalk construction?
- b. What is usually used to "cut" shellac?
- c. What is the approximate tensile strength per square inch of mild structural steel?

(2) *The recall type.* This type of question involves memory, but goes a step further in that selective thinking must also be used. This is seen in the following questions, in which the parts to be recalled are represented by blanks.

- a. Thomas A. Edison was an _____ who lived for many years in the state of _____.
- b. Henry Ford is best known as a manufacturer of _____.
- c. The name of John L. Lewis is intimately associated with the _____; that of William Green with the _____.

(3) *The question that requires selective thinking.* This type involves thought processes of a higher order than in the two preceding ones. A few examples will illustrate this:

- a. Why is mahogany "sponged" with water before stain is applied?
- b. Explain why lacquer is applied to better advantage with an air-gun than with a brush.
- c. In warm dry weather why are bricks commonly moistened before they are laid?

(4) *The question that calls for appreciation or interpretation.* One may know much and still lack appreciation. Questions of the appreciation type are useful in teaching us to see and to value what might otherwise remain unappreciated. An assignment can be made more meaningful through questions that ask for evaluation or interpretation. The following ones will help to make this clear:

- a. To what do you attribute the charm of Early American furniture?
- b. Why are Persian rugs of better quality prized highly?
- c. What is there about modern furniture that appeals to many people?

Although the four types of questions illustrated do not constitute a complete list of types, they are sufficient to show important differences. For purposes of motivating assignments first one, then another, will best serve the purpose. In most instances a varying combination of types is most helpful.

Nichols' *Woodworking Manual for Students* contains a good feature in the form of blank space headed "Additional Questions and Suggestions." Here the pupil can supplement the questions and other material that are given by that which the teacher, the pupil, or members of the class have to contribute.

8. *The appeal of trade literature.* Every progressive teacher of industrial arts or of trade or industrial education should keep in touch with the latest developments in those areas of human effort that relate to his instruction. Every unit of work can be

* Talmage Nichols, *Woodworking Manual for Students*, Peoria, Ill., The Manual Arts Press, 1930

made more interesting by referring pupils to the wide range of educationally valuable trade literature which is issued by business and manufacturing industries. Illustrative of such material are:

- (1) *Instructions for the Care of Your Chevrolet*
Chevrolet Motor Company, Detroit, Michigan.



FIG. 34. View of a general metal shop, Tulsa, Oklahoma. Sheetmetal benches are in the central foreground. Foundry equipment is shown in the left rear, and heat-treating furnaces in the right rear of the room. Machine tools are placed near the furnaces.

- (2) *Small Homes of Burned Clay*
Structural Clay Products Institute, Inc., Washington, D. C.
- (3) *Better Wood Finishing*
Grand Rapids Wood Finishing Co., Grand Rapids, Michigan.

From time to time lists of sources of shop materials appear.⁵ They often come in mimeographed form because such reference material gets out of date quickly. Industrial concerns may have a large supply of some interesting pamphlet for free distribution,

⁵ Clifford H. Dustin, *Sources for Shop Materials*, Concord, N. H., State Board of Education, 1932. See, also, *Buyer's Guide*, Industrial Arts Department, Iowa State College.

and shortly thereafter the supply may be exhausted. One of the most readily available sources of trade catalogs and other trade literature is advertisements in professional magazines, such as *Industrial Arts and Vocational Education* and *Industrial Education Magazine*. Another source is the trade and technical magazines, of which there are usually several for each type or branch of instruction offered in schools.

In school shops the toolroom boy is often encouraged to study trade literature when not busy handing out tools. This reading is a part of his assignment. Some instructors encourage all students who have a little time to spare—perhaps because their project was completed ahead of schedule—to use the various forms of reference material that are provided.

9. An assignment in spelling for trade and technical students. In order to illustrate how the assignment must be suited to the nature of the instruction to be given, there follows herewith an indication of how an assignment is made by Shuman in teaching spelling to trade and technical students.⁶ Each unit of the work is introduced by a challenging heading which serves to arouse interest. For example: "Words frequently confused." "Does it end in ain or ian?" "Terms heard in carpentry." Each assignment has unity. It is frequently related to some fundamental principle in spelling or it may contain words that are of special value to pupils in a particular shop, such as in the machine shop, electrical shop, or foundry.

A technique frequently employed is to specify in the assignment: "Learn the spelling, pronunciation, and meaning of every word. Write each word three times, then use it in a sentence." The emphasis on learning through doing is apparent in such assignments.

10. An assignment in blue-print reading. In teaching blue-print reading the assignment often combines a sketch or drawing with questions based thereon and with things to do about it. Each question is designed to bring out some essential point, and the sketch is a means of checking to see if the pupil has visualized the original drawing correctly. For example: The assignment contains a front view and the plan of a wedge. The pupil is

⁶ John T. Shuman, *Spelling for Trade and Technical Students*, Boston, The Christopher Publishing House, 1934.

asked to explain why certain lines are drawn in the way they are; to indicate the length of others; and to draw a free-hand, three-view sketch of the object.⁷

Although it would be possible to teach blue-print reading without calling for sketching or drawing, there are distinct advantages in combining reading with sketches or drawing. The muscular participation involved helps to make learning more permanent, and the skills developed are likely to be useful to those who have need for mastering blue-print reading. Learning blue-print reading is often the first step toward developing ability to sketch, to draw to scale, and to design.

11. An assignment in sheetmetal work. Butler has published a set of 26 job sheets in metalwork, which will serve to indicate how assignments are made for that type of instruction in written form.⁸ His job sheet, No. 11, contains the following topics or captions:

TO MAKE A DUST PAN

Purpose: This is a brief but effective motivation of the project.

Material: Suggestions are made about the material that is appropriate for this project.

Tools: A list of the necessary tools required for the job.

Drawing: The pupil is asked to make a free-hand sketch of the dust pan from the isometric drawing that is shown.

Procedure: Suggestions are given for making the project. Each part, namely, the body, top, and handle, is treated as a unit.

A completely dimensioned working drawing is provided.

Questions: These are practical questions dealing with this job but also having educational value of a broader nature. For example: "What are some of the difficulties encountered in handling tin?"

The pupil is required to figure the costs of the project.

References: A number of helpful references are listed for supplemental study.

Appraisal: This step provides for evaluation of the job that was done.

Record: Here are recorded the time that was required for the job, the rating that the pupil secured, and the instructor's criticism of the entire unit of work.

⁷See Castle, *Problems in Blueprint Reading*, Peoria, Ill., The Manual Arts Press, 1926, pp. 28-9. Also, H. C. Greens, *Blue-print Reading and Shop Sketching for the Metal Trades*, New York, John Wiley & Sons, 1924, p. 55.

⁸John B. Butler, *Job Sheets for Problems in Metal Work*, Peoria, Ill., The Manual Arts Press, 1929.

12. An assignment in home mechanics. One of the well-known sets of job sheets in home mechanics was developed by Tustison.⁹ In general style they are much like those developed by Butler in metalwork and Weber's job sheets on practical electricity.¹⁰ Tustison uses these captions: reasons for the job, material, tools, procedure, questions, reference, and record.

Incidentally, the United States Department of Commerce has issued *Care and Repair of the House*.¹¹ This bulletin contains many helpful suggestions that are of interest to those who enjoy taking care of their homes. Suggestions are made on the care and repair of all parts of the house, from foundation to roof. Government publications that are related to the care and repair of the house are listed. A check-list is also included, which is of assistance in checking the house for repair work that may need to be done.

The term "home mechanics" is commonly used for that phase of industrial arts education which relates to the home. It includes all sorts of work that is performed in keeping the home in good condition and in adding to its comfort, serviceableness, or attractiveness. If a comparison be permitted, one may compare home mechanics to community civics. Just as community civics serves as a good starting point for a study of civics in its broader bearings, so home mechanics may serve as a good starting point for industrial arts, which should include a much wider area of learning.

13. The assignment in shop theory. One of the effective ways of studying shop theory is through instruction sheets, supplemented demonstrations, and class discussions. Among the most helpful material of this kind can be mentioned the instruction sheets that have been developed by the staff of the Henry Ford Trade School.¹² They are commendable because the content is

⁹ F. E. Tustison, *Job Sheets in Home Mechanics*, Milwaukee, Wis., The Bruce Publishing Co., 1924.

¹⁰ Walter B. Weber, *Job Instruction Sheets on Practical Electricity*, Second edition, New York, John Wiley & Sons, 1931.

¹¹ Vincent B. Phelan, *Care and Repair of the House*, Washington, D. C., United States Government Printing Office, 1931.

¹² Henry Ford, *Shop Theory*, Dearborn, Mich., Henry Ford Trade School, 1934. See, also, other publications of a similar nature issued by the school.

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¹²Henry Ford, *Shop Theory*, Dearborn, Mich., Henry Ford Trade School, 1934. See, also, other publications of a similar nature issued by the school.

well selected, well organized, and the illustrations are superior and plentiful.

These "lesson sheets" are bound in book form. This particular book to which reference has been made deals with shop theory that is related to machine shop practice. It contains helpful tables, many practical questions with concise answers, and carefully worded definitions. Fundamental principles and essential mathematical calculations are also included.

The book differs from much instructional material in that the answers to the questions follow much as they do in some "hand-books" that are in common use for purposes of vocational education, safety-first instruction, and the like.

The questions that are given can be supplemented by others in such ways as will best serve the requirements elsewhere.

14. The shop project as an assignment. The shop project, or "problem" as it is sometimes called, serves as a good assignment of the unit type. Pupils are naturally interested in making projects in the shop. This interest on their part needs to be guided. Making a good assignment in shop instruction pre-supposes that there will be suitable direction of the work.

Project descriptions as found in current periodicals and other publications often serve as excellent instructional material if presented or assigned in the right way. At the expense of repetition, but for the sake of emphasis, let it be said that it is *not* good procedure merely to refer a pupil to a written description of how some shop project is made. Such practice lacks suitable motivation; it does not provide for sufficient mental effort on the part of the learner; and it is not sufficiently educational. To serve an educational purpose the project description needs to be supplemented through questions requiring analytical and evaluational thinking.

There should also be a "tie-in" to fundamental truths or principles and in many instances reference reading and discussion. The work should likewise be correlated with other school instruction and with out-of-school learning.

15. The contract assignment. It is probable that the term "contract" was borrowed by educators from the field of industry or of business. Just as a contract is usually made for service of

considerable extent—it is uncommon to use a formal written contract for day labor—so the contract in educational work is a large-unit assignment.

In form and content the contract should vary greatly in order that it be suited to its purpose. In some instances the outcomes sought are highly specialized. In other instances they are broader. Sometimes the work is of an objective nature and at others it is quite subjective. This implies that the contract should not be a standardized form of schoolwork and that for the sake of needed flexibility there must be many forms in which the contract is drawn up.

A relatively long-time assignment like the contract has the advantage that it makes for the coordination of learning. Various "subjects" or areas of learning, such as science, mathematics, and drawing, may be needed. Each is chosen with reference to given requirements that are called for in the contract. The completion of the contract often cuts across traditional, academically determined boundary lines just as do life experiences. From this point of view the contract is a helpful form of learning assignment. It is representative of life.

B. THE NATURE AND FUNCTION OF DRILL

16. **The importance of habit formation.** A habit is a learned tendency to respond to the same situation in the same way. Habits are mental, physical, and emotional. They play a more important part in our lives than is commonly appreciated. There are obvious advantages in having certain responses so habitual that we make them very readily and speedily.

There are relationships between skills and habits. Skills are grounded in purposeful habits. Skill implies ability to do something unusually well. It calls for intelligently directed habit formation. Based upon conscious habit formation at the outset, skill can develop to the point where the action is almost unconscious, as is seen in the reactions involved in driving an automobile after a high degree of mastery has been attained.

Skill can also develop far beyond mere habit formation. The skillful craftsman has learned resourcefulness and creativeness that go far ahead of the bounds of simple habit formation.

Habit formation forms a significant part of teaching the practical arts and is also significant in vocational education because various kinds of skills are sought as outcomes of such education.

17. **Drill as a means of habit-building.** The procedure of habit-building is simple enough. It consists in repeating correctly what is to be learned until the response is automatic. This repetition is known as drill. The task of directing such repetition so that it will be something very different from a monotonous and deadening routine calls for judgment and ability on the part of the teacher. Although it is impossible to anticipate all problems that arise in practice, the following points may be suggestive.

(1) *See that the learner starts correctly.* Several conditions are necessary in order that the learner shall start right. First, it is evident that there must be *attentiveness* and concentration on what is to be learned. Motivation is desirable not only at the outset but also from time to time as repetitive action takes place. The technique of motivation has been discussed previously. Second, there must be a *clear concept* of what is to be learned. The mental picture or image held by the learner influences considerably his habit formation. Individuals must be taught to see, to hear, or to feel what may have escaped their untrained senses. A boy in the shop must be taught to recognize the "fine points" of craftsmanship before he is in a position to master them. Before a pupil is taught how to sharpen a knife, chisel, or other edge tool he should be able to recognize how a sharp tool looks and how it feels to the slightest touch.

As an essential part of a right start in learning a skill, the pupil should understand *why* he is expected to perform the activity in the way he is asked to perform it. And, furthermore, why sustained repetition is required. Drill does not need to be of the unthinking type. It need not become a deadly, enervating succession of repetitive acts. Intelligence and foresight can be brought to bear upon the work. The learner can be taught to see the implications and outcomes of drill. He can be led to see that mastery, whether it be in music, writing, the fine arts, or the practical arts, requires long hours and years of interesting drill—repetitive effort which is transfused by a mental attitude that gives life and enjoyment to what might otherwise be boredom.

Third, in motor or physical skills see to it that the act is demonstrated correctly and in such a way that the correct technique is recognized. If the action must be fast, it can be explained through slow motion analysis, much as the technique of golfing and pole vaulting is examined.

(2) *Permit no errors to occur.* Faulty responses must be recognized in order that wrong habits may be prevented. It is often more difficult to unlearn an erroneous habit than to acquire a new one. There is a best way of doing everything, and that procedure needs to be followed persistently. It is obvious that errors will be made in repetitive practice, but this is not serious as long as the learner recognizes the mistake and strives to overcome the difficulty in accordance with the right way which was shown him.

(3) *Encourage practice.* The physiological explanation of the need for encouraging extended practice after a proposed habit has been started successfully rests in the fact that in order to make the response automatic it must become so habitual that the control is transferred from the higher to the lower nerve centers. The advantages in doing this are, first, that it releases the brain for other activity. This enables an individual to excel the one who has not reached that stage of habit development. Second, it permits the response to be made more quickly and with greater certainty.

Attentiveness and concentration are factors that significantly influence learning. Habits are learned more quickly when the learner concentrates upon the practice. Consequently, one of the things that the teacher should strive for is to cause the learner to repeat the activity with eagerness to exceed his own best previous record.

Concentration is also needed in order that wrong methods may be avoided. It is not uncommon for a beginner to think that he has mastered a skill before he has done so. He is able to follow some, but not all, the techniques involved. To illustrate: In learning to apply varnish the learner may have developed reasonable mastery in how to dip and strike off his brush, and how to hold it in use, without having attained that dexterity of wrist movement that is possessed by the experienced worker.

Resourcefulness is required to instill in young people the mental attitude and the ideals that will insure persistent practice on their part. Mastery is not secured without considerable effort. Many devices used in teaching are designed to change routine drill into interesting mastery procedure.

(4) *Suit the length of the drill to requirements.* Physical as well as mental habit-building varies much in the effort that is required. This is readily noticeable in "practical" work in school shops. To plane rough, warped, and knotty lumber by hand is heavy work. In contrast with this, to operate a power machine is much easier. Frequently the nature of the requirements for shopwork are such that it is easy to change from one form of work to another so that undue fatigue does not come even with work-periods three hours in length. It is well known that repetitive work is more tiring than activity that is varied. Drill must be alternated with rest-periods. Fatigue may be temporary or chronic. With most people it is temporary. Physical fatigue may be noticed by the way an individual goes about his work. Fatigue slows up reaction time. The posture is inclined to change to what is commonly recognized as representative of one who is fatigued. Shoulders may droop, the arms hang more limp, the feet approach a slow gait or a shuffle.

There are marked individual differences in the extent to which a given amount of work brings on fatigue, and also in the way persons show it. Mental-set can offset the influence of fatigue for a time, but, since fatigue represents a toxic condition which chemical analysis has revealed to be due to an excess of lactic acid and acid potassium phosphate, something more than determination is needed to relieve fatigue. The signs of fatigue may be misinterpreted unless one knows the individual concerned. What appears to be fatigue in some may be lack of interest, or occasionally even laziness. So the matter of adapting the length of the period of drill to the pupil's strength is seen to be a matter that requires careful observation and study.

(5) *Quality comes first.* In developing motor skills, accuracy and other factors that make up quality of workmanship are more important at the outset than speed and quantity. Speed comes best through guided practice after the right way has been mas-

tered. Quality of workmanship is not necessarily independent of speed, for the two may be inter-related. But, in teaching manipulative skills, evidence points in the direction of stressing quality before quantity.

In seeking to develop accuracy in manipulative work, the wise instructor will recognize the relationships between maturity and the standards of performance that are asked for and also between capacity and what is sought. The standards of quality that are to be achieved must be suited to individuals as well as to the goals of the units of learning.

(6) *Teach skills through individual instruction.* To a limited extent practical skills can be taught effectively on a group basis. Time can be saved here and there through group demonstrations and through other forms of class instruction. In the main, however, motor skills are learned best through individual guidance. After the group demonstration is over, the teacher can be of most help by watching each individual as he tries to follow correctly the activity to be mastered. In this way the instructor can determine the nature of such guidance as may be needed.

Individuals respond differently to instruction. Some are strong in ability to visualize and others are not; some have fine muscular and mental coordination, others do not. Such factors can be handled best through individual instruction by the teacher who is sensitive to individual differences.

(7) *Awareness of achievement.* If a blind man were left in a forest, it is probable that he would starve to death before he found his way out. Learning without knowing the results that are being achieved is much like that. In order to make maximum progress the learner must have a clear idea of what is wanted, coupled with means of knowing how closely each repeated trial brings him toward the goal. In "practical" work it is frequently possible to use objective measurements that will reveal the quality as well as the quantity of the work that was done. Objective scales that are suited to self-rating are educationally helpful. Projects that have been made by other pupils serve as a basis of estimating achievement.

In plant training, where apprentices are taught on production work, much care is taken to make certain that the learner knows

how well and how fast he works as compared with others. One way of recording this is to have him do jobs for which the proper time limits have been established. The apprentice is required to do each job, according to standards that have been set, within a given time. If he completes them in less time, he receives commendation; if he does not meet the requirements of quality and time, he may lose his job.

(8) *Drill discriminately.* The amount of repetition that is required should be determined by taking into consideration the learning difficulty involved. Obviously some things are much more difficult to learn than others. Shuman has recognized this well-known fact by listing groups of words that are commonly misspelled.¹³ In written instruction sheets supplemental questions and refereuces are used for a similar reason. In shop practice teachers learn through experience to drill more on the difficult things than on those that are readily comprehended.

But "learning difficulty" is only one of several factors to be taken into account. The relative importance of the habit or skill is certainly significant. There are so many things to learn that selections must be made. Other things being equal, drill for permanent mastery in what is most conducive to growth, development, and achievement that contribute to social welfare and economic security.

Another factor, individual differences, is equally crucial in determining the amount of drill that should be given. But, since that has been discussed previously from different angles, it will not be elaborated upon here.

C. THE NATURE AND FUNCTION OF REVIEW

18. *The function of review.* The modern concept of the nature and function of review differs much from the older view. According to the older idea the purpose was to re-learn what had been studied before to increase retention. According to the older traditional concept, review was not intended to add vitally to what had been learned.

In sharp contrast with this, the newer belief is that review should be in the nature of a different and new view. To illustrate,

¹³John T. Shuman, *op. cit.*

when one leaves home and all that implies for a trip to distant parts of the United States or to foreign lands, one goes with certain ideas concerning the home town. After being away from familiar scenes and the home community that is known so well, one's ideas of values change. The green pastures that were anticipated turned out to be brown barren hills or long stretches of sagebrush with only an occasional oasis as a haven of refuge.

After the trip is over the experiences are brought up in retrospect. They are reviewed. The outcome? The old home town has become more precious. Values were revealed that had escaped previous notice. Life at home henceforth will be deeper and richer—for the comparison and evaluation that were possible after the experience. In much the same way the review is a new view; one from a different angle; one that goes beyond the first.

Review technique is not to be confused with drill. Drill consists in repetition for the sake of establishing habits or skills, whereas the objectives of review are the getting of something more than was obtained previously. Among the specific goals of review are these:

(1) *To increase perspective.* A major function of review is to relate what has long been known to that which has been recently acquired in such ways that insight will be deepened. As a result of the new view better understanding results. The purposes and outcomes of the unit of work become more clear.

(2) *To unify learning.* Another purpose of review is to relate the long known to the recently learned, and the more or less loosely related elements of newly mastered knowledge to one another in such a way that unity takes the place of unrelatedness. The fusion of apparently unrelated learnings into an organic whole is brought about through the over-view that can be given effectively after the elements have been mastered one after the other.

(3) *To make recall more certain.* This is not to be achieved through repetition as in drill procedure but through getting a new view from another angle, which will supplement the earlier one. Different illustrations may be used. Additional thought-provoking questions may be asked. Multi-sensory aids may be brought into use. Original thinking can be encouraged. All these and other

procedures can be applied toward making learning more permanent.

19. **Procedures of review.** In order that review shall be as helpful as possible to learners, the following suggestions are offered:

(1) *Concentrate on the most important things.* Let review be an intriguing game of having each learner determine for him-

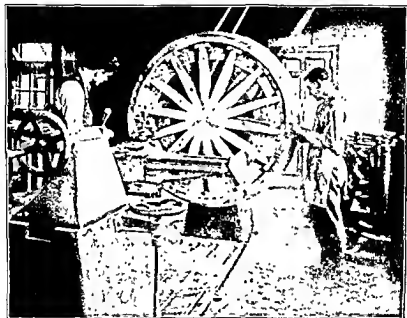


FIG. 35. These students at the Williamson Free School of Mechanical Trades are making a pattern for a flywheel.

self what is most vital. Teach students to differentiate between the main points and supplementary details. Have them concentrate on the key items. If those are understood the details are relatively easy to supply.

(2) *Use a topical outline.* A topical outline, and other forms of outline, help to bring out continuity and unity in subject matter. By using this device for review purposes the learner obtains a better idea of the relationship of part to part. Making an outline also helps toward the retention of knowledge because it is a form of visual-sensory participation.

(3) *Review by using supplementary aids.* Supplementary references, questions, and points for discussion are likewise helpful in giving a new view of instructional material. Students should be urged to use these aids.

(4) *Review through discussion groups.* Review can be made interesting and profitable by arranging for small discussion groups that meet outside of class or shop hours to review by means of discussion.

(5) *Review through problems.* A method of review that is well suited to practical arts and vocational education is to gain a deeper and more appreciative understanding of subject matter through solution of problems. These can serve as suitable means of determining whether or not the learner can apply the knowledge and theory that he is expected to master.

(6) *Review through reports.* Two kinds of reports are employed for review purpose—oral and written. Sometimes the two are combined. Pupils may be held for a rather extensive written report or for a short five- or ten-minute oral report that is based upon the written one. When this latter plan is used, the pupil should be led to make the oral report without the use of notes or with a minimum of reference to them.

(7) *Review through questions.* Question and answer technique can be used effectively in review. The learners may ask questions of one another. They can be asked to prepare good, representative questions in writing with a view to having them answered orally by classmates. Another plan is for the teacher to invite questions on any phase of the work that has been covered.

(8) *Review through use of a check-list.* One hears the comment occasionally from pupils that they have no clear concept of what the teacher wants them to know. Some teachers anticipate this, and prevent it, by preparing extensive lists of items that serve as a kind of index or check-list of the more important points, principles, or theories that are to be mastered.

One may also review to advantage by checking against class notes and material that has been put in notebooks. Another method is to check on questions, problems, cases, and points for discussion found in text and reference material.

20. When to review. The best time for review is a matter that must be determined by taking into consideration the maturity and capacity of the learners and the nature and organization of the subject matter. One method that is well suited to some kinds of instruction is to give a five- or ten-minute review whenever the class meets. Another is to give a review at the end of each of several large units of learning that make up the work of the term. A third plan is to review only at the close of the term. A fourth method is to review at relatively short intervals as well as at long intervals.

PRACTICAL SUGGESTIONS FOR TEACHING

It is now our purpose to make a few suggestions which, in the light of what has been said, may be helpful in teaching.

1. Many lesson assignments are made too hurriedly.
2. Unless the lesson assignment is clearly understood, the learner cannot work efficiently.
3. Before a lesson can be assigned clearly it must be thought through clearly by the teacher.
4. Skill is grounded on purposeful and intelligent habit formation.
5. Drill may be motivated so that it is not monotonous and deadening.
6. The modern concept of "review" is to make it a new, deeper, and broader over-view.

FOR DISCUSSION

1. What are the chief advantages in making the lesson assignment at the beginning of the period of instruction? At the end?
2. What can be said in favor of and against the practice of making assignments on the bases of pages?
3. Explain what is meant by a project assignment.
4. What advantages, if any, has the project assignment over the chapter assignment?
5. What method of assignment is commonly used in: (a) mathematics; (b) science; (c) drawing; (d) industrial arts shop; (e) trade instruction?
6. What are the characteristics of a good assignment?
7. What arguments can be advanced for and against motivating the assignment?
8. Do you believe that the assignment should direct learning? Give reasons for your conviction.
9. Explain what is meant by a definite assignment.

10. Distinguish between definiteness and clearness in making an assignment.
11. Write out an assignment for one of the following: (a) supplemental information for a project in industrial arts, or (b) related information for a unit in vocational mathematics, science, or drawing. Discuss this assignment as to its fitness for the purpose for which it is intended.
12. Write out an assignment for a unit of work of the shop or manipulative type, for either industrial arts or vocational work, and explain and justify it orally.
13. Develop an assignment sheet for teaching appreciation. For example: To teach appreciation of art in shop projects.
14. Show relationships between habit formation and the development of skill.
15. Explain the place of drill in progressive education.
16. What are the essential steps in teaching motor skills?
17. Indicate the desired outcomes of review.
18. What are some of the procedures that are used in review?
19. Compare the purposes of drill with those of review.

FOR SUPPLEMENTAL READING

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CHAPTER XVII

TEACHING AIDS AND DEVICES

THE BETTER TEACHERS USE MANY AIDS AND DEVICES

1. Sources of helpful materials. Industrial arts and vocational industrial teachers use trade literature extensively. Many manufacturers and dealers have prepared educational material that is among the best that is available. Much of it can be secured free or for a nominal amount. A list of more than one hundred sources of such teaching aids was prepared by Hughes.¹ He has given the address of each concern or organization and has indicated the cost of each publication. A large proportion of the material contained in his list is sent free of cost. Many of the concerns listed have a number of pamphlets that are helpful to teachers.

Carl V. Lindeman has compiled a list of references to sources of educational bulletins and other helpful material which will be of interest to teachers.² He has classified his references to sources of materials and supplies under suitable headings, such as: archery, craft supplies, drafting materials, general hardware, and the like.

Another good list was prepared by John R. Phelps.³ He has organized the material under the following six main headings: automobile mechanics, concrete work, electrical work, metalwork, printing, and woodworking. Each of these main topics is divided into: (1) motion picture films and (2) booklets. For the metalwork group an additional classification was made for sheetmetal.

Raymond W. Burgett has compiled a classified guide to about 800 dealers and manufacturers that sell materials and products

¹ Wayne P. Hughes, "Teaching Aids," *Industrial Arts and Vocational Education*, 26:274-6, September, 1937.

² Carl V. Lindeman, "Aids for the School Shop," *Industrial Arts and Vocational Education*, 23:312-13, 354-2, October, November, 1934.

³ John R. Phelps, "Illustrative Material for School Shops," *Industrial Arts and Vocational Education*, 21:341-4, December, 1932

commonly used in industrial arts and vocational classes. The references are classified as follows: abrasives, automotives, cement, ceramics, crafts, drawing, electricity, metalwork, photography, printing, woodwork, and miscellaneous.⁴

2. *The Work-book as a teaching aid.* In the field of general education, notably in English, mathematics, history, natural sciences, social studies, and in the foreign languages, many work-books have appeared since 1915. A survey of 220 school systems, made in 1931 by Goodrich, reveals that 47 per cent of these districts were using work-books in four or more areas of learning.⁵

Work-books are, in reality, a development from instruction sheets, which are in common use in practical arts and vocational education. It is probable, without having advertised the fact, that many shop teachers are using what are essentially work-books.

A work-book may be defined as *a book which outlines units of work, gives more or less detailed suggestions, includes motivational features, and contains numerous instructional and diagnostic or testing aids for the individual use of learners.* Some work-books are intended for use in connection with one or more specified textbooks. More often they are planned to cover given units of work without relationship to a particular textbook or books.

Among the desirable features of work-books may be mentioned:

(1) *Diagnostic features.* Devices for self-evaluation, try-out, and exploration are certainly desirable in work-books for industrial arts and probably also for vocational pupils. Individuals are not through with guidance even though they are preparing for definite vocations.

(2) *Motivation.* Every subject or area of learning can be made more interesting through proper motivation. This may take many forms, such as interesting illustrations, challenging and life-like approaches, statements of appealing goals, and the like.

(3) *Pre-tests.* Pre-tests of the objective, new type are reveal-

⁴Raymond W. Burgett, *Buget's Guide to Industrial Arts Materials and Supplies* (mimeographed), Industrial Arts Department, Iowa State College, 1935.

⁵J. G. Umstattd, *Secondary School Teaching*, Boston, Ginn and Co., 1937, Chapter VIII.

ing and interesting. They serve to show what the pupil has mastered before he *undertakes the unit of work* to be covered, and they are also useful in measuring progress.

(4) *Assignments*. These can be made concise, clear, and challenging. Written assignments have the advantage that, by taking more time for study, the less gifted pupils will comprehend them as well as the superior ones. This is not always possible when assignments are made orally.

(5) *Good organization*. In spite of the modern stress upon freedom in learning, it is still true that instruction should be presented in a way that is educationally logical. Haphazard learning is too likely to fall short at crucial points. A good work-book shows evidence of good organization in its content.

(6) *Wisely directed learning*. Learning may be suggested without directing it in restraint of discriminating, original thinking on the part of the pupil. A good work-book guides the learner in ways that mesh with American ideals of education. Instruction is well directed when it emphasizes the meaningfulness of the units of work; when it develops thoughtfulness, creativeness, and social mindedness, and when it furthers well-integrated subject matter mastery.

Learning that is so directed makes definite provisions for collateral study or for supplemental manipulative experiences. It also calls for a suitable distribution of time to the end that each vital aspect of the units of work shall be covered.

(7) *Self-testing for achievement*. This is a feature that appeals to the learner as well as to the instructor—and it is not without educational value. The tests can conform in length, style, and difficulty to the background and ability of the learners. The new-type objective self-corrective tests are often employed in work-books.

3. *How work-books are used*. In the areas of practical arts and vocational education, work-books are usually looked upon as supplementary aids, much in the same way as instruction sheets. One procedure is to keep the books on file at the school and to give them out at stated times for specified work to be done either during school hours or at home. A more economical method than that which calls for a work-book for each pupil is

the plan in which only sufficient work-books for one section of a class are purchased. The answers are not written in the books but on separate paper. These questions are then discussed during the class period. By using the books on different days each work-book is used by a number of pupils. This method, although more economical, is also less satisfactory than to provide a work-book for each pupil.

The nature of the work-book will have much to do with the way in which it may be used to best advantage. Some have detachable sheets for tests, sketches, drawings, and the like. Most of them are so organized that they can readily be adapted to individual differences and varying needs.

4. **Handbooks.** The word "handbook" is interpreted rather widely for present purposes. One type is intended for teachers, principals, and other supervisory or administrative officers. An example is the *Handbook of Safety Regulations*, published by the Board of Education of the City of Detroit. It describes preventive safety and fire protection measures, and deals with the procedures for handling accidents.

The Detroit Board of Education also issues a *Handbook On Industrial Arts and Vocational Education*. This outlines objectives, lists curriculums, and describes courses taught in the public schools of Detroit. Philadelphia and other cities also have similar publications. Other handbooks, manuals, and guide books are:

(1) Bedell, Earl L., and Gardner, Ernest G., *Household Mechanics*, Scranton, Pa., International Text Book Co., 1937. This publication contains more than a hundred practical jobs for general shops. It stresses the jobs that are commonly met in home repair work. The book is written on a high school level.

(2) Castle, Drew W., *Problems in Blueprint Reading*, Peoria, Ill., The Manual Arts Press, 1926. This book has elements of a work-book. It contains sheets of cross-section paper upon which drawings or sketches are to be made. It is a pioneer in its field.

(3) Douglass, J. H., and Roberts, R. H., *Instruction and Information Units for Hand Woodworking*, Wichita, Kans., The McCormick-Mathers Co., 1932. This book contains information units pertaining to materials, tools, and processes. The information units are followed by instruction units, which include refer-

cences, suggestions for procedure, questions, and suggested assignments.

(4) Dragoo, A. W., and Dragoo, K. L., *General Shop Metalwork*, Bloomington, Ill., McKnight and McKnight, 1936. This is one of the low-priced paper-bound booklets—like most of the others in this list—which have been planned particularly for general industrial arts shop use. However, its usefulness is not limited to the general shop. It contains a good array of well-illustrated projects and also appropriate information for instructional purposes.

(5) Fryklund, Verne C., and Laberge, Armand J., *General Shop Woodworking*, Bloomington, Ill., McKnight and McKnight, 1936. This is a companion book to the preceding one. It is characterized by well-selected content, an abundance of good illustrations, and by an arrangement that makes adaptation to different conditions easy.

(6) Karcher, Harry M., *Electricity Course Outline and Instructional Material*, Oswego, N. Y., published by the author, State Normal School, Oswego, 1937. This is a distinctly superior collection of carefully selected and well-outlined units of work in electricity that will appeal particularly to industrial arts teachers. (Mimeographed.)

(7) Nichols, Talmage, *Woodworking Manual for Students*, Peoria, Ill., The Manual Arts Press, 1930. This manual or notebook is intended for the individual use of students. It contains information about machinery, tools, processes, fasteners, and the like. It also contains stock bills, lumber table, and a plotting or sketching section. The illustrations are good.

(8) Willoughby, George A., and Chamberlain, Duane G., *General Shop Handbook*, Peoria, Ill., The Manual Arts Press, 1936. This publication is particularly strong in the worth-while "related" information it contains—the kind that is basic to successful shopwork. Many units of work are covered. They include: drawing, woodwork, metalwork, finishing, plumbing and pipe fitting, concrete, electricity, and others.

5. Instruction books on specified topics. Because of variations in treatment, it is difficult to draw a sharp line between some of the classifications that best fit some of the literature dealing with

industrial arts and vocational education. The following publications appear to belong to this classification:

(1) Livingston, Everett G., *Keene's Cement Craft*, Ames, Iowa, Industrial Arts Department, Iowa State College, 1935. This is an interesting and helpful publication dealing with a material that has many possibilities for instructional purposes. The author gives many suggestions based on his experience with Keene's Cement. A number of well-designed suggestive projects for industrial arts classes are given.

(2) Richards, George H., *A Guide to Woodworking Problems*, Ames, Iowa, Industrial Arts Department, Iowa State College, 1934. A classified list, by types of shop projects, of references in books from 1917 to 1933, and in magazines from 1925 to 1933.

(3) Williams, Amos G., *A Guide to Metalworking Problems*, Ames, Iowa, Industrial Arts Department, Iowa State College, 1935. This is a companion contribution to the preceding one. Problems in cold, ornamental, and bench metalwork are listed in 28 classifications. Their sources in books and magazines are indicated.

6. Equipment devices. Many ingenious pieces of special equipment have been developed in order to make it possible to do difficult work more easily and more quickly. It is our purpose merely to illustrate their nature, for there are far too many to describe in this book.

Tee-squares are sometimes handled improperly. They become nicked at the edges and untrue. Bryant developed a simple planing jig by means of which it is possible to correct defects easily. He recommends keeping the jig and a plane in the drawing room so that the tee-squares need not be sent to the shop instructor for repair.⁶

A large share of work on the engine lathe must be centered. After the learner has become familiar with the hand methods of doing this, it saves time to use a jig such as the one made by Alley.⁷

Suggestions as to how small supplies, such as nails, screws,

⁶ Frederick J. Bryant, "Tee-Square Planing Jig," *Industrial Education Magazine*, 30:22, July, 1928.

⁷ W. E. Alley, "A Centering Device," *Industrial Education Magazine*, 30:299-300, February, 1929.

hinges, bolts, and the like, can be kept in a satisfactory way are described in a brief article by H. D. Crull.* Other illustrations and descriptions of cabinets that are well designed for their purpose have appeared from time to time in the magazines, *Industrial Arts and Vocational Education* and the *Industrial Education Magazine*.

7. Pictures of shop tools and equipment. The Stanley Rule and Level Company of New Britain, Connecticut, has long been engaged in cooperating with educators by making available wall cards depicting more than thirty tool charts. These charts are useful devices for teaching the construction and the proper names of tools and their component parts. The same company also issues "Sixteen Things to Make in Your Home Work Shop."

Many fine photographic reproductions of major equipment can be secured through manufacturers and dealers. These pictures are sometimes hung in classrooms where "related information" is taught.

The South Bend Lathe Works, of South Bend, Indiana, has a series of forty or more blue-prints and charts for school shop use. A few are 8½ inches by 11 inches in size, but most of them measure 12 inches by 18 inches. They are sent post-paid for 10 cents each. Text and reference materials in pamphlet form are likewise available at nominal prices.

A series of more than fifty drawings and job sheets of machine shop projects are likewise available through the same concern. The price of these varies from twenty cents to two dollars per project. Rough castings and steel and hardware for many of these projects are also sold.

8. Displays illustrating processes of manufacture. These vary considerably in nature. The process of making paper is illustrated by the Hammermill Paper Company, Erie, Pennsylvania, through a display of samples of raw materials and partially manufactured materials, together with a booklet describing and illustrating how paper is made.

A number of concerns, from time to time, prepare a limited

*H. D. Crull, "Cabinet for School Supplies," *Industrial Education Magazine* 30 231-2, December, 1923.

number of wall-type displays showing the processes of manufacture of a file, hammer, saw, shears, electric cable, drop forged pliers, and the like. Many of these are available only to the larger schools.

Displays having much educational value are often made by pupils. Such displays illustrate such features as: different kinds of nails, screws, bolts, and other kinds of fasteners; kinds of wire,



FIG. 36. A group of industrial arts students in the wood-shop of the Northwest Junior High School, Reading, Pennsylvania.

cable, moldings, conduits, etc.; kinds of hardware; kinds of insulating materials; kinds of sheathing materials. Pupils enjoy gathering materials for, and arranging, such displays.

9. Samples as teaching aids. Samples of materials used by schools for instructional purposes are also varied in kind. Among them may be mentioned samples of cabinet woods that show the effects of different kinds of finishes, such as stains, varnishes, and lacquers. Other samples show different thicknesses or kinds of ply-wood. Some dealers in cabinet woods put out samples of the more common cabinet woods.

Glue manufacturers have samples which can sometimes be secured free by shop teachers.

Other manufacturers are glad to send free samples of abrasive papers and cloths.

Samples of drawing papers, tracing papers, detail papers, and blue-print papers and cloths can be used to advantage in teaching. The samples can be secured from leading manufacturers and dealers in drafting materials.

Manufacturers or dealers of building materials are often glad to contribute samples to schools where such materials are studied. Samples of various kinds of wall boards, insulating materials, brick, tile, stone, and roofing materials are representative of this kind of teaching aid.

Many other kinds of samples are available that will help to make industrial education interesting and instructive.

10. Suggestions for teachers of printing. One of the common difficulties experienced by teachers of printing is teaching pupils to distinguish *d* from *b*, and *p* from *q*. As a result, type cases are seldom free from type that is misplaced. J. E. Fintz suggests that instead of making this a personal matter, the student be encouraged to develop desirable habits and right attitudes concerning the re-distribution of type.*

To this end he proposes that consideration be given *why* a mixed or dirty type case is undesirable. This is done by pointing out the errors that will result, the time factor involved, and the increased cost of production that comes through error.

In order to explain the points especially to be observed, the Cleveland schools made large models of the letters in the pattern shop. These models were made so that the vertical element of the letter can be moved up or down. By showing the effect produced the student can more easily see the features that must be watched. The rule that is drawn from the demonstration is: "Hold the letter, face toward you, with the nick up. Imagine that the vertical element on the letter is moved in the opposite direction from which it appears. The letter is then seen correctly." The rule, of course, is an old one; the demonstration is clever

* J. E. Fintz, "Teaching Them Their P's and Q's," *Industrial Arts and Vocational Education*, 22 69-70, January, 1933.

Some helpful suggestions on how to prepare instructional aids for the print shop have been made by Muntz.¹⁰ He recommends the use of pictures or illustrations, 8½ inches by 11 inches in size, of material such as: illustrations that show appropriate spacing of words and lines; indentations; employment of initial letters; proper and improper setting of advertisements; press makeready; and page imposition. Other suggestions include: pictures of shop equipment; successive proofs of color printing; how photo-engravings are made; making printer's rollers; stereotyping; and the making of newspapers.

Teachers of printing commonly arrange displays of outstanding samples of commercial printing as well as representative work of their pupils.

Some schools also get out booklets dealing with the historical aspects of the graphic arts. These are interesting, not only to printers, but to many persons who desire an appreciative understanding of the graphic arts.

11. Suggestions for teachers of woodwork. In order to conserve time that might otherwise be spent in follow-up instruction, Christopher has described a teaching device.¹¹ It consists of a demonstration cabinet that contains many of the more representative forms of construction, such as miter joint, open mortise, and tenon joint, and haunched mortise and tenon joint. Flush, flat, and raised panels are incorporated. Several forms of drawer construction are shown.

To teach cabinet hardware, the demonstration cabinet, which is only 19 inches long, 12 inches wide, and 13¾ inches high, also illustrates four kinds of hinges, five kinds of locks or catches, and five kinds of miscellaneous hardware.

Another teaching device suitable for teaching beginning woodwork is to arrange a full-size model showing how certain joints, such as half-lap, are made. One of these that has come to the writer's attention was so constructed that the pieces were held in a frame. They could be revolved at will, thus enabling the pupil to study each successive step in advantage.

¹⁰ Harry J. Muntz, "Make Your Own Visual Aids," *Industrial Arts and Vocational Education*, 26:183-6, June, 1937.

¹¹ C. H. Christopher, "Woodwork Teaching Device," *Industrial Arts and Vocational Education*, 22:318-19, October, 1933.

12. Teaching pupils how to measure. Beginners in shop and mechanical drawing classes sometimes have difficulty in reading fractional parts of an inch. In many instances the rule, scale, or square that is used is divided into sixteenths of an inch. A device that is of assistance in this connection is described by Quinlan.¹² It consists of a blue-print 10½ inches by 8 inches in size, on which is shown a length of board. On this board is laid out an inch that is drawn eight times full size. Each sixteenth is plainly shown, much as is customary on rules and scales, in lines of different length to denote 1/16, 1/8, 1/4, and the other divisions. But this difference is to be noted: The drawing has the correct fractional part of the nick designated on each of the sixteen subdivisions.

Large-scale reproductions of a draftsman's scale—eight to twelve feet long—are sometimes used to teach beginners how to read the "architect's" scale.

13. Teaching aids for the drafting room. In school drafting rooms wall charts, showing how letters and figures are made, are quite common. Some of the dealers in drafting equipment and supplies furnish free "lettering sheets" to schools. These sheets serve much the same purpose as the wall charts.

Tables of decimal equivalents of fractions are often made in drafting rooms, and are used there and in shops.

Large-scale slide rules are used occasionally as teaching devices, but it is more common to teach pupils to read the slide rule by using the pocket-size.

Handbooks that contain data on strength of materials are used by advanced students in design, and in figuring stresses.

A sample of the kind of information that is needed in teaching drafting is presented by Olsen.¹³ His article covers the characteristics of the most commonly used raw materials that are utilized in the manufacture of stamped products. These include: aluminum, brass, bronze, fiber, monel, and hot and cold rolled steel.

Another device used by teachers of drawing is to supply draw-

¹² J. Charles Quinlan, "Teaching the Student How to Measure," *Industrial Arts and Vocational Education*, 24 348, November, 1935.

¹³ J. K. Olsen, "Related Subjects for the Drafting Room," *Industrial Education Magazine*, 26:120-1; 24, April, 1937.

ings or blue-prints of the type, "What Is Wrong with This Drawing?" in which the student checks the drawing for errors.

14. How models compare with blue-prints. An experiment was conducted by Johnson to determine the relative value of teaching mechanical drawing with the aid of blue-prints as compared with objects or models.¹⁴ Sixteen matched pairs of pupils were used. The total class time for each pupil in the experiment was 90 clock hours. Eighty-five per cent of this time was spent in actual drawing; 15 per cent in demonstration of instruction.

Among Johnson's conclusions drawn from this study are: "To the extent of this study and within the limits of this experiment, the use of models as a technique in teaching mechanical drawing was found to be superior to the blueprint method."

He wisely concedes that it would probably be better to use both blue-prints and models. Common experience indicates that the extent to which either or both are used must be determined by circumstances such as the nature and purpose of the instruction and the maturity and experience of the learners.

Johnson believes that his experiment indicates that serious consideration should be given to using models in teaching mathematics and art in secondary schools. This, of course, is done to some extent. It should probably be done more extensively.

15. Check-lists of teaching aids. The magazine *School Management* has featured check-lists of aids to teachers. These have appeared monthly since September, 1931. Although many of the references apply to areas of learning other than industrial arts and vocational education, the lists also contain a number of references that are valuable to teachers and administrators of industrial education. Recently published books, new government publications, and information about educational films are mentioned.

16. Increasing use of the radio. In 1887, Rudolph Herz first demonstrated the existence of electro-magnetic waves. Since that relatively recent time many scientists and inventors have contributed to the development of an industry that has come to assume major proportions. A recent survey conducted by the

¹⁴Victor A. Johnson, "Teaching Devices in Mechanical Drawing," *Industrial Arts and Vocational Education*, 26:49; 52-53 February, 1937.

United States Office of Education indicates that more than 12,000 radios and centralized sound systems are to be found in American schools. This development is coming more quickly than many realize. The public is enthusiastic about radio. Major issues of the day are presented over the radio. Many highly educational programs are available from time to time, and the schools of tomorrow will be equipped to take advantage of such valuable forms of education. The techniques for using the radio for educational purposes are being developed just as the techniques of other forms of audio-visual instruction are being refined.

To get the most out of a radio address, symposium, or discussion, the learner gives serious study to the topic before he "listens in." He listens for definite things and, after the program is over, he discusses, evaluates, and draws conclusions.

Individuals can be taught to get much out of radio when they are taught how to do it. They must be taught to *interpret* what they hear much as Mineta Merton advocates doing in teaching through still pictures.¹⁵ When still pictures are used, pupils must get a true concept of size. This is often secured by including in the scene some familiar object—a person, animal, or object that is known.

The concept of speed must be sensed in the still picture when speed is represented. Motion, power, temperature, and color must likewise be interpreted. Sound can be imagined, distance can be visualized, and depth should mean something definite. Odor is typical of paper and pulp manufacture, of tanneries and slaughter houses—very different from that of candy factories, chocolate factories, and fruit packing houses.

Just as learners can be taught to interpret these qualities in still pictures, so others need to be interpreted in radio instruction and in motion pictures.

17. The effect of radio on learning. An experiment to determine the effect of radio musical accompaniment on learning was reported by Zyve and Smith.¹⁶ The study concerns 140 fourth-

¹⁵ Mineta, Merton, "Visualizing Teaching through the Correct Use of Still Pictures," *Educational Screen*, 16:115-16, April, 1937.

¹⁶ Claire Zyve and Evelyn Smith, "The Effect of Radio Musical Accompaniment on Accomplishment in School Work," *Educational Method*, XIII:306-8, April, 1938.

fifth-, and sixth-grade pupils. About 60 per cent of the children prefer to read at home with music. Approximately 40 per cent prefer to do arithmetic at home with music. In the neighborhood of 80 per cent say they have the radio on at home while they work.

The test indicated that there were no measurable advantages in musical accompaniment. Neither does it appear to have as detrimental an effect on learning as many fear. The conclusion is that whether or not musical accompaniment should be used during home-study should be left to the judgment of the parents who can make their decisions on the basis of the behavior of the individual child.

18. **Text and reference material.** State departments, teacher education institutions, and city and country leaders of practical arts and vocational education receive many requests for help in selecting suitable textbooks and reference material for industrial arts and vocational education.

In response to such demands the Pennsylvania State Department of Public Instruction appointed a general steering committee and many supplementary committees. Under the leadership of M. M. Walter and others a score card for evaluating text and reference books in industrial education was developed. The highest possible ratings that were recommended for each of the five major divisions are as follows:

I	Subject matter content.....	70
II	Drills and reviews.....	6
III	Kinds and types of illustrations.....	12
IV	Mechanical phases.....	7
V	Author—experience and training.....	5
Total score.....		100

Each one of these five major points was divided into detailed items arranged in the form of a score card, on which each subdivision is rated as either poor, fair, or good with numerical equivalents of 1, 3, and 5.

A sub-committee of three competent persons was appointed for twelve main kinds of shop instruction and seven in related subjects. Each committee indicated whether the books examined

were recommended for industrial arts, trade preparatory, or trade extension education.



FIG. 37. This view of the portable broadcasting equipment used by students of the C. B. Connelley Vocational High School, Pittsburgh, Pennsylvania, shows how a progressive industrial school meets present-day demands. It will be remembered that the first commercial broadcast in the United States was made in 1916 from KDKA, the Westinghouse Station, Pittsburgh.

The ratings were made on the basis of group judgment and with the aid of the score card. The weighting assigned to each point on the scale was determined after careful study and with

the aid of experienced persons. The validity and reliability of the score card were not determined scientifically. The score card, therefore, represents a good practical effort to help teachers to select suitable instructional material but does not claim to be more than the result of the combined judgment of a small group of experienced teachers.¹⁷

It is, of course, apparent that visual-sensory aids are very valuable aids to learning. But, since a chapter in this book has been devoted to that discussion, we shall merely call attention to it at this point.

19. Records and reports as aids. Educational records and reports serve a dual function. On the one hand they are aids to organization and management and, on the other, to instruction.

The range of record forms that are used in secondary schools is impressive. It will be our purpose to call attention to only a few representative forms that may be suggestive to teachers.

(1) *Application blank*. The following application blank combines two essential things—data about the applicant and information about what he wishes to take.

APPLICATION BLANK

	VOCATIONAL SCHOOL—Night Classes
Name.....	(Place a Cross after the Courses You Want to Take)
Date.....	No. 1—Machine Demonstrations and Lectures for Beginners
Where Employed.....	No. 2—Blue-print Reading for Beginners.....
Department.....	No. 3—Shop Arithmetic—Beginners.....
Kind of Work.....	No. 4—Sheet Metal Drawing and Lay-out.....
Foreman.....	No. 5—Milling Machine Demonstrations.....
Purpose in Taking Night Work	No. 6—Lectures on Steel and Iron.....
	No. 7—Blue-print Reading—Advanced.....
	No. 8—Shop Arithmetic—Advanced.....
	No. 9—Shop English.....
	No. 10—Demonstration of Wood Turning and Bench Pattern Work.....
	No. 11—Lectures on Moulding.....
	Special Classes
	No. 12—Beginning Pattern Making.....
	No. 13—Beginning Machine Drawing.....

A form of application blank that is used for vocational evening classes.

¹⁷ Commonwealth of Pennsylvania, Department of Public Instruction, *Analysis of Book Material in the Field of Industrial Education*, Bulletin 62, Harrisburg, Pa. (Issued by the Department.) See, also, *Score Sheet for Analysis of Book Material in the Field of Industrial Education*, by the department.

(2) *Admission.* Before the applicant is admitted, someone who is qualified to do so should determine whether or not he meets the requirements. If so, he may be given a card of admission that purpose.

CLASS ADMISSION

.....19.....

To the teacher:

Admit

To class to take

.....Principal

A form that is used when students are to be admitted to classes.

(3) *Withdrawal.* The procedure for withdrawal from class when that is advisable naturally varies among schools. The following blank is used by a mid-western school. The withdrawal slip is made out by the counselor and approved by the superintendent.

..... High School

WITHDRAWAL

Date19.....

M.....

Remove

from your class list.

.....

1st.... 7th.....

2nd . . . 8th.....

3rd... 9th.....

4th . . . 10th... ..

5th ... 11th

6th . . . 12th.....

Ap

A record form used when pupils are to be dropped from the class list.

(4) *Book receipt.* When a textbook is lent to a student a record is necessary. The form that follows has been designed for that purpose.

..... PUBLIC EVENING SCHOOL

Receipt for Free Text Book Loan

I hereby acknowledge receipt of

Name of book..... Price.....

for use in

Class..... Teacher.....

This card will be filed as a charge against you. Upon return of this book be sure to receive card as your receipt, otherwise you may be called upon to pay for the book.

Name.....

Address.....

Telephone Number.....

A record form for books lent.

(5) *A receipt for tools borrowed.* The form that follows can be used in several ways. It may be used instead of the metal tool-room checks that are in common use. It may likewise be used to advantage as a check on tools that are to be used outside the school shop. As was mentioned elsewhere, some schools are lending tools for home-craft activities, much as the library lends books for home use.

..... JUNIOR HIGH SCHOOL

ELECTRIC SHOP

Date..... Teacher.....

I Have Borrowed the Following Tools:

1.....

2.....

3.....

4.....

5.....

Student's Name.....

This form is used in keeping a record of tools that are borrowed.

(6) *Excuse for absence.* Adults attending evening classes sometimes find it impossible to attend regularly because they are needed "on the job." The form that follows herewith has been prepared so that the employer can report this easily.

The School District of the City of

EVENING SCHOOL.

This is to certify that
was employed by us on the evening of
..... so that attendance at Night School was not possible.

Signed _____

Official Position

Date

A form for the employer when the student misses evening or part-time classes because of work.

(7) *Inter-shop requisitions.* It is occasionally very convenient for one teacher to secure supplies or material from another in-

... .. **INTER-SHOP REQUISITION**

Date	Wanted for purpose of	Job No.			
Quantity	Description	Unit Cost		Amount	

Req by _____
Approved by _____
Issued by _____

An inter-shop recursion.

structor who stocks such material regularly. To illustrate, a teacher may wish a few sheets of large-size paper such as is regularly stocked in the print shop. In some schools records are kept of this and requisitions are used. The following form is one that is made in triplicate and is used only for inter-shop requisitions.

(8) *Cooperation in guidance.* In order to make it easy for the teacher to cooperate with the counselor, the following form has been prepared:

GUIDANCE PROBLEM

To School Counselor

.....19.....

Name of Pupil..... Section.....

Reported by.....

Remarks.....

.....

.....

A form for coordinating guidance.

(9) *Warning when work is unsatisfactory.* In education, as in medicine, it is better to recognize danger signals as soon as they can be detected rather than let the case continue to get worse. The following form is one that has proved helpful in actual practice. It is issued by the teacher, and is passed on to the pupil through his or her counselor. It is issued as soon as there are evidences of unsatisfactory work.

Warning Slip

Name..... Date.....

Subject..... Hour.....

Teacher.....

Counselor..... Day.....

Remarks.....

.....

The warning slip—a useful device for notifying pupils concerning their work.

(10) *Commendation.* A more welcome word than that obtained

from the preceding report form is contained in the word of commendation that is sent by many schools to pupils who have done superior work.¹⁸

HONOR ROLL ANNOUNCEMENT

..... JUNIOR HIGH SCHOOL

TO THE PARENTS OF

We are glad to announce that is entitled to Honor Roll standing for the report period just completed. We are sure you will be glad to hear this and we ask that you will encourage to keep up the quality of school work needed to maintain such standing.

....., *Principal.*

The honor-roll announcement—an effective motivating device.

20. Home visitation. Home visitation should not be left solely to the "visiting teachers." In many instances the visiting teachers must confine their efforts to problem cases. It is very necessary that all the homes of pupils be visited. Such home visiting is needed as a background for the most effective teaching and for the wisest counseling and guidance. When a pupil is irregular in attendance, an attendance officer may be sent to investigate the matter; when there is illness a nurse or health officer may be assigned to the case; but when the pupil does not fall into these classifications he may not be visited.

Teachers say: "I have 350 pupils each semester. How could I possibly visit so many homes? Some of them are long distances from the school." It would not be necessary for each of four or a half dozen teachers that a pupil has during any given semester to visit him. If suitable records are kept in an office where they are accessible to all, it might suffice to have one teacher visit each pupil each year except in cases where more frequent contacts seem advisable. Under such a plan the load on the teaching staff would be reduced considerably.

21. Objectives of home visiting. Before home visits are undertaken, certain things ought to be clear. There should be definite planning concerning these visits; they should have definite objectives. On the one hand, the visits are to supplement the

¹⁸For examples of other record forms that serve as aids in teaching, see: J. J. Eaton, *Record Forms for Vocational Schools*, monograph, World Book Co., 1916.

information available about the pupils; on the other, and by way of contrast, these visits should help to interpret the school to the parents. Such contacts are intended to strengthen the bonds of friendship between parents and teachers; they should be designed to further a more sympathetic understanding of pupils and to bring about better cooperation between the school and the homes.

Higgins and Gleason report that one satisfactory method of approach is to tell the pupils that the teacher expects to visit their home at a stated time.¹⁹ This serves the double purpose of making certain that the visit will be made when the parents are at home and of giving those parents who wish to do so a chance to extend an invitation to the teacher. They found that teachers are quite welcome in many homes where the parents did not think it necessary to extend invitations. Among the means used to secure invitations were the explanation that the teacher wished to see some pet, project, or something the child had made. When special problems needed attention, these were made the reason for the visit. Some of the teachers did not wait for invitations as they felt it might appear to be too formal an approach.

Time may be saved by visiting a number of pupils living in the same area and by assigning visits to teachers on the basis of ease with which the teacher can reach the home. The time of visiting can usually be arranged so that it is suitable to both parents and teachers.

It is probably best not to take notes in the presence of parents or the children—it makes the visit seem so formal and inspectional whereas the underlying purposes are to develop good will and better understanding. Records should be made as soon after the visit as possible, while the essential facts are fresh in the teacher's mind.

22. Parents visit schools. It is just as desirable to make the school so interesting, and the invitation so cordial, that parents and other adults will want to visit the school. Home visiting by teachers and school visiting by parents are supplementary, each

¹⁹ Harold H. Higgins, and Charles H. Gleason, "Home Visitation," *Educational Method*, 15:378-87, April, 1936.

to the other. Parents and other adults can profit by coming to school to see for themselves what goes on there. These parent-teacher relationships that take place under school auspices can mean much to both.

School exhibits are interesting to parents, but to witness their children engaging in regular schoolwork is fascinating to them. It is also more enlightening in that it enables them to see how their children participate and how they compare with other children.

Parental visits to school are especially necessary where the pupils live far from the school or where communication through travel is so slow that it is very difficult for the teacher to visit the home.

23. Shop problems on tracing paper. Sets of working drawings of shop projects or problems are available. They are printed on tracing paper, ready for blue-printing. A series of 25 or more sets of such plans are issued by the Manual Arts Press, Peoria, Illinois. They include sets on: art metalwork, woodwork, wrought-iron work and equipment devices, electrical work, furniture, sheetmetal work, and general metalwork.

The magazine *Industrial Arts and Vocational Education* includes Tracing Supplements that are sent out from time to time with the magazine. These supplements, though copyrighted, may be reproduced for school shop use only.

The Wrot Iron Designers issue a series of four portfolios of "Art in Iron," *School and Homecraft Series*, which aims to provide artistic designs adapted to abilities ranging from the young beginner to the experienced hobbyist.²⁰ These designs are printed on heavy paper, not on tracing paper. The same company also supplies the material required for the projects described in their portfolios.

Blue-prints in portfolio, by William L. Hunter, are published by the Manual Arts Press. The sets include: (1) Birdhouse Problems, (2) Puzzle Problems, and (3) Wood-Turning Problems.

24. Correspondence study material. The method of instruction through correspondence is variously designated as: cor-

²⁰ The Wrot Iron Designers, 541 West 35th Street, New York, N. Y.

respondence-study, home-study, correspondence courses, and directed and supervised correspondence study.

In correspondence instruction the course is pursued on an individual basis, with or without supervision of teachers other than those who correct the correspondence lessons.

Correspondence instruction has long been used. Among the pioneers in the United States was Dr. William R. Harper of the University of Chicago, who, in 1886, was teaching more than 1000 students through correspondence.



FIG. 38. Showing how radio maintenance and repair is taught at Oakland, California.

More than fifty privately financed correspondence agencies in America have been inspected and approved by the *National Home Study Council*, Washington, D. C. An approximately equal number of colleges and universities that offer correspondence courses hold membership in the *National University Extension Association*.

Some states, Massachusetts and Pennsylvania, for example, are by law empowered to have prepared for them, or to purchase, instructional material that is used for instruction through correspondence. *Privately controlled correspondence courses* have also long contributed significantly toward making available excellent instructional material.

It is estimated that in the United States there are in the

neighborhood of 2,000,000 individuals who are seeking self-improvement through correspondence instruction. This costs them about \$70,000,000 in annual tuition.²¹

25. *Methods of teaching.* The success of correspondence instruction depends to a great extent upon how well the assignments are adapted to home-study or to supervised school-study, and to individual needs. The better instructional material that is available is of much value. It can be used by the teacher to supplement other material to any extent desired.

In some courses the material designed for correspondence instruction can be drawn upon occasionally as needed. In others, the correspondence course will supply a complete unit of instruction. Material of this sort is used by colleges and universities, by secondary schools, and by industries.

A desirable way of using correspondence course material is to have the work done under the supervision of competent teachers. Perhaps the first American city to use correspondence instruction material in such a way was Benton Harbor, Michigan, where Superintendent H. C. Mitchell introduced the plan in 1923.

The state program of directed correspondence study in Pennsylvania, and elsewhere, is projected in the conviction that correspondence study material can be used very effectively to enrich the curricular offerings of schools.²² It makes it possible for individuals in the smaller towns to receive, through such means, valuable forms of instruction that would otherwise be denied them.

The Pennsylvania study suggests that the instructor who supervises correspondence instruction hold standard certification to teach the subject he supervises, or that he be qualified as a director of such study. When the instructor cannot be certified in the subject—as is often true in the smaller centers—the manuscript-correction service should be left to those who are certified.

The limited qualifications of instructors in the smaller or "non-service" centers will not prevent their conducting classes of

* A. W. Castle, "Directed and Supervised Correspondence Study," Bulletin, Commonwealth of Pennsylvania, Department of Public Instruction, Harrisburg, Pa., 1937.

²² *Ibid.*, Part III.

thirty pupils who are studying from five to thirty different subjects. Such instruction must, however, be supplemented by effective service by certified teachers and by measures of achievement and examinations by those who are qualified or hold certification to render such service.²³

26. Service to industries. Some agencies providing correspondence instruction have featured technical and other courses to employees of industrial establishments. The Pennsylvania State College is one of several colleges and universities which, through its extension service, makes available high-grade instructional material. Competent supervisory service is also provided when desired. The modern land-grant college renders many forms of aid for home-study and for directed correspondence study.

Correspondence instruction is also available through land-grant and other colleges and through private agencies to prospective teachers, such as skilled craftsmen who wish to qualify for teaching and to teachers. Many persons reside where they cannot attend classes. For such, correspondence instruction is an important means of self-improvement.

27. Shop kinks. There are many clever ways of performing manipulative work that are known variously as "kinks of the trade," "tricks of the trade," and "shop kinks." From time to time the professional magazines in industrial education have given space to some of them. Examples are how to tear sandpaper, how to use a "fence" in jointing lumber by hand, how to do hand striping on automobile bodies, and how to glue hexagonal, octagonal, and round-shaped objects, such as wastepaper baskets and "built-up" pedestals or columns.

Shop kinks are also illustrated in a number of periodicals that devote space to "practical" work conducted for hobby or recreational purposes.

Trade journals likewise contain references of this sort. Other aids of this kind are found in trade manuals, handbooks, textbooks, and reference works. To illustrate, *Principles of Mill and Paint-Shop Practice* by Ralph G. Waring contains many kinks that are helpful in painting and decorating.²⁴

²³ *Ibid.*, p. 52.

²⁴ Ralph G. Waring, *Principles of Mill and Paint-Shop Practice*, Milwaukee, Wis., The Bruce Publishing Co., 1930, pp. 189, 201, 234, etc.

PRACTICAL SUGGESTIONS FOR TEACHING

On the basis of the preceding discussion the following suggestions are offered:

1. The progressive teacher is constantly on the look-out for new teaching aids and devices. The better teachers use many teaching aids.

2. Many teaching aids are free or of nominal cost.

3. One must read the current professional and trade periodical literature to keep up-to-date.

4. Encourage the parents to visit schools and the teachers to visit homes of pupils.

5. Make it your business to obtain a variety of reference material, of illustrative material, and of objects, specimens, and samples that will enrich your teaching.

6. A practical demonstration is more effective than a thousand words.

7. Directed correspondence instruction given under public school auspices enables the schools to extend their usefulness greatly.

FOR DISCUSSION

1. What sources of helpful instructional material can you name for your field of major interest?

2. Make an annotated reference list of the following, and be prepared to discuss their merits.

- (a) Work-books in your area of major interest.

- (b) Trade manuals in your area of major interest.

- (c) Handbooks in your area of major interest.

3. Describe an equipment device not mentioned in this book, and demonstrate its use.

4. Mention several sources of illustrative material and describe their nature and purpose.

5. What kinds of samples well suited to your major field of teaching can be secured free or at nominal prices?

6. What forms of visual-auditory aids are best suited to your instruction?

7. Evaluate the radio as a teaching aid for: (a) home-study, (b) school use in your field of interest.

8. Criticise the score card for evaluating textbooks which is described in this chapter.

9. How can the record forms shown in this chapter be improved?

10. If you have had personal experience in visiting the homes of pupils, what is your judgment concerning its value and practicability?
11. How can parents and other adults be interested in visiting schools more frequently?
12. Mention a number of sources of shop problems or shop projects that are suited to your area of special interest.
13. What correspondence study material is available for your field of teaching?
14. What is meant by "directed teaching"?
15. What standards or conditions should be met in order that correspondence instruction may be accepted as the equivalent of class or group instruction?
16. Describe a shop task that is of value in teaching.
17. Bring with you samples of record forms used in your school. Compare them with those shown in this chapter. Describe some that are different.
18. Describe a pre-test that has been found to be useful for a particular type of instruction.
19. Compare the effectiveness of models with blue-prints.
20. Mention and evaluate several teaching aids not mentioned in this chapter.

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CHAPTER XVIII

TESTS AND MEASUREMENTS

HOW THEY ARE USED TO IMPROVE INSTRUCTION

1. Testing is not new. Tests and measurements of various types have long been used. An elaborate system of examinations was conducted on a nation-wide basis in China more than two thousand years before the Christian era.

Both written and oral examinations were used by medieval, as well as by modern, universities. In the United States the Boston Grammar School Committee used written examinations as early as 1845.

More recently there has been a strong interest in testing. A study by Franke and Davis shows that more than six million standardized tests were given in the secondary schools in 1931.¹ Professional journals in practical arts and vocational education, as well as in general education, devote considerable space to testing and measuring for purposes of diagnosis, guidance, and instruction.

In discussing tests and measurements no effort is made to give an inclusive list of tests. Those mentioned are given merely as examples of types.

2. Types of educational tests. Educational tests are grouped into two main classifications, namely: (1) essay-type and (2) objective tests. The essay-type examination presents certain difficult problems to the teacher. The examination is difficult to score. Much depends upon the examiner's judgment. The handwriting, the English, how sentences are phrased, neatness, and other factors are likely to influence the score. It must be admitted that essay-type examinations are scored subjectively. There is evidence to show that approximately equally competent examiners

¹J. Murray Lee, *A Guide to Measurement in Secondary Schools*, New York D. Appleton-Century Co., 1936, p. 3.

will assign widely varying scores to the same essay-type examination, and that the same instructor may do likewise on successive occasions.

Essay-type examinations have points of strength as well as weakness. Through such a form of test an individual can express himself logically and fully. It reveals something of his command of English and of grammar. Spelling and handwriting are also shown to better advantage than in the newer form of tests. The essay-type examination can be used to advantage at times, but is not satisfactory for exclusive use.

The chief objections to the essay-type examinations are that they cannot be scored objectively and that they are not comprehensive enough to be valid. The questions or topics covered are too few in number to give a representative sampling of a large area of work.

An objective test is one which is free from personal judgment in scoring. It is a test so devised that the same score will be given by any competent examiner, or by the same examiner at any time.

Objective tests are made so that the learner can indicate his responses briefly and quickly. The responses often involve checking, underscoring, or encircling words or phrases. In this way it is possible to give a much more comprehensive examination than the essay-type. The objective-type examination, because it can cover a much wider sampling of test elements, gives a more reliable index of pupil achievement than when only a few questions are asked, as in the essay examinations.

3. **Standardized tests.** Tests may also be classified as: (1) standardized and (2) informal, unstandardized, or teacher-made. A standardized test is one that is made up of test elements which have been selected carefully in the light of their appropriateness and of their innate learning difficulties and are accompanied by "norms" or representations of the typical or average performance.

Such tests are particularly useful in making comparisons with recognized general standards. They are also used effectively to compare one group with another—either in the same school system or elsewhere

Standardized tests are much more common in general or academic, than in practical arts and vocational, education. Examples of standardized tests that are used in industrial education are: "Vocational Interest Blank," by Edward K. Strong, Jr., and "The Minnesota Mechanical Ability Tests."

4. **Informal, teacher-made tests.** Most tests used by teachers are of this type. These tests are similar to standardized tests, but differ from the latter in that norms have not been made available for them. Their validity and reliability usually have not been determined scientifically.

On the other hand, objective, teacher-made tests are very useful. They can be easily adapted to the local requirements, and they may be more fair or valid than a standardized test in that they may better cover what was actually taught.

Informal tests are well suited for testing in the field of the practical arts and vocational education where differences in background of previous experience and differences of equipment and materials must be taken into account.

5. **Tests classified according to purpose.** In addition to the classifications that have just been mentioned, tests are also classified as to aim and purpose in the following manner:

- (1) Intelligence tests
- (2) Aptitude and prognostic tests
- (3) Achievement tests
- (4) Diagnostic and analytical tests

Intelligence tests attempt to measure mental ability, which can be briefly defined as the ability to learn and to adapt oneself to new or novel situations. Many schools use such tests as a basis for ability grouping. For purposes of practical arts and vocational education, additional tests or measurements are needed for ability grouping.

Intelligence tests are also used to predict future success in high school and in college. Such tests do not measure special aptitudes, such as are needed for success in the fine arts, the practical arts, or in mathematics, but they correlate well with success in general education given on the college level. In all these four types of tests there are those that are made for individual testing and those for group testing. An intelligence test

of the individual type is Terman's revision of the Binet-Simon Test.

Among group intelligence tests may be mentioned: The Otis Group Intelligence Test, the Haggerty Intelligence Examinations, the Terman Group Test of Mental Ability, and the Kuhlman-Anderson Intelligence Tests.

Some tests are so made that they can be self-administered. The Stroug Vocational Interest Blank is of that type, as are also the Otis Self-Administering Tests.

6. **Aptitude tests.** There are tests for measuring many kinds of aptitudes. Among these are tests of mechanical aptitude, such as the Stenquist Mechanical Aptitude Tests, the Detroit Mechanical Aptitude Examinations for Boys and for Girls, and The Minnesota Mechanical-Ability Tests.

Aptitude refers to the capacity that an individual possesses to develop some definite ability or skill. A mechanical aptitude test is intended to measure the capacity that is possessed by an individual to do work with the tools and materials used in mechanical and manufacturing pursuits.

Aptitude tests are prognostic. They aim to indicate natural or acquired fitness which can be translated into abilities through proper environment or education.

In order to use tests and scales intelligently one must understand their limitations as well as their advantages. It is probable that more harm has come to the testing movement through its poorly advised friends than through its opponents.

Mechanical aptitude tests, in their present state of development, should be regarded as no more than helpful *supplements* to teacher and parental observation and to try-out and exploratory experiences in pupil guidance.

It is probable that the judgment of a competent shop teacher, who has had an individual in his classes for a half year or more, is more reliable than the score in a mechanical aptitude test, in determining probable future occupational success in mechanical or manufacturing pursuits.

This opinion is based in part upon the known limitations of such tests and in part upon the fact that success in mechanical pursuits requires many things other than mechanical aptitude.

It calls for diligence, perseverance, cooperativeness, honesty, and other traits that are not measured by such tests but which teachers can observe and take into account in evaluating a pupil's fitness for jobs in industry.

7. Achievement tests. The term "achievement test" is used to designate an examination that measures accomplishment acquired primarily through schoolwork. Both informal or teacher-made tests and standardized examinations are used for this purpose.

A distinction is made between general achievement tests and diagnostic tests. A general achievement test is intended to show an individual's *relative* achievement in a given *area* of instruction. In the majority of instances the purpose of general achievement tests is to indicate the relative standing of pupils in a group.

To know that a learner stands in the upper one-third of his class is a more reliable index of his achievement than to know that he received an absolute grade of ninety or "A."

The general achievement test is not designed to diagnose specific weaknesses but to measure relative accomplishment which is designated by a single score.²

8. Diagnostic and analytical tests. In contrast with the general achievement test, the diagnostic and analytical tests are designed to reveal *specific elements* of strength or weakness in learning or in teaching.

Diagnosis is, or should be, one of the major purposes of tests or examinations that are given during the progress of instruction. The final examination should be an achievement examination.

A diagnostic test in mechanical drawing will reveal the points of strength or weakness in various specific elements, such as lettering, accuracy of measurements, correctness of conventions, arrangement, weight of lines, neatness, and the like.

Such a test can be diagnostic from the standpoint of the learner. It may likewise be diagnostic for the teacher in that it

² Herbert E. Hawkes, *The Construction and Use of Achievement Examinations*, Chapter II.

can show in what respects the instruction was "put over" successfully and in what respects it was faulty.

Examples of tests having diagnostic value are: the *Shop Tests*, by William L. Hunter, and the Newkirk-Stoddard *Home Mechanics Test*.

9. The trade examination. A trade test or examination is designed to measure a number of factors, which together are indicative of trade competency. Such a test is intended to be diagnostic and it is also a measure of achievement. Trade examinations of the comprehensive type are designed to measure more than trade knowledge and skills. A written examination, comprehensive and diagnostic in nature, is used to measure the individual's familiarity with trade understanding and trade theory.

A practical test is employed to measure the ability to handle tools and materials in a workman-like way. Speed and accuracy are measured through practical performance under conditions that approximate conditions "on the job."

In addition to these tests, the comprehensive examination includes an oral examination. This may include elements designed to reveal interests, attitudes, ideals, and convictions. It may be used to reveal personality traits and character since these are significant factors in success in industry and in teaching. The oral examination is also used to bring out elements that were not covered in the written or the practical test, or factors that supplement others that were included in the other tests.

In point of time, there is naturally much variation, for trades differ greatly and so do trade examinations. The oral test may take from a half hour to two or three. The trade test often requires three hours, and the written examination from an hour to three hours.

The practical phase of the comprehensive test is given on projects or "doing" jobs that are representative and fair samplings of the trade or occupation. Experience indicates that objective scoring is made easier when the practical work that is assigned is completed—it is more difficult to score jobs that are not completed within the time allowed.

10. University of Pittsburgh trade tests. For some years a group of persons, with the guidance of an advisory committee headed by G. D. Whitney, and under the close supervision of Walter B. Jones, has been working on trade tests in building trades, metal trades, and miscellaneous trades.³ This testing program was begun in 1926.

In a report made three years later, Dr. Jones indicated the need for more scientific methods in developing trade tests. He also called attention to the fact that factors other than trade competency must not be overlooked in selecting individuals.⁴

From the beginning, four chief types of tests were used, namely, oral, written, procedure, and performance tests.

Work has been done on such kinds of trade tests as carpentry and cabinetmaking, electric wiring, plumbing, sheetmetal, mechanical drafting, machine shop, patternmaking, automobile mechanics, electric power, printing, radio servicing, coal-mining, and air-craft mechanics.

From the experience with these trade tests are drawn the following suggestions and recommendations:⁵

(1) Trade experience can be checked by an examination of eight or nine hours, if such an examination includes both a written test and performance on the job. The former provides comprehensiveness; the latter tests skill.

(2) The trade test forms a good check on statements of trade experience secured through employers and personal affidavits.

(3) Test evidence appears to be valuable in strengthening certification procedure for shop teachers.

(4) The procedure of test construction and administration through seminars seems to be a feasible one, especially since it is desirable that tests be revised and improved constantly.

(5) The written test should consume from two to four hours. The long comprehensive test is favored.

(6) The diagnostic value of the tests seems apparent. Strengths

³University of Pittsburgh, *A Report of a Program of Trade Tests at the University of Pittsburgh* (mimeographed), published under the direction of the vocational teacher training staff, University of Pittsburgh, 1933.

⁴Walter B. Jones, "Testing Candidates for Teacher Training Classes," read before American Vocational Association, New Orleans, December, 1929.

⁵University of Pittsburgh, *op. cit.*, pp. 6-7. (Used by special permission of Dr. A. M. Goldberger.)

and weaknesses are revealed, and the student is thereby able to fortify certain areas of his training.

(7) It appears probable that in some trades a full day for the performance test would serve better than the five-hour period which was used. For most trades, however, five hours seem to be adequate.



FIG. 39. Hard at work in the forge shop at the Carl Schurz High School, Chicago, Illinois. Craftsmen of all ages have enjoyed expressing themselves through ornamental iron work.

(8) The matter of charging a fee to defray the expenses of testing should be considered.

(9) A scale for compensation for examiners should be established.

(10) Cooperative testing by all vocational teacher-training centers in the state, through the Pennsylvania Department of Public Instruction, seems desirable.⁸ Such a testing program

⁸ For a further discussion of trade tests, see J. W. Fleming, and Walter B. Jones, "Trade Tests on Storage Batteries," *Industrial Arts and Vocational Education* 21.14-16, January, 1935.

might well be carried out under the supervision of a bureau equipped to conduct such testing programs, as the Bureau of Educational Records and Research in Pittsburgh.

11. **The procedure test.** In the procedure test a number of short statements are used, each of which refers to a step or procedure that is involved in a job or project. These operations are listed in a random or unselected order. The requirement is to arrange them in proper sequence. To illustrate, let us take a simple job, that of replacing a broken window pane. The procedure test may read:

Job: To Replace a Broken Window Pane.

Directions: The proper steps for carrying out this job are listed herewith, but not in the correct order or sequence in which they should be done. Rearrange these items in the correct procedure as shown by placing the correct number in the parentheses provided.

- (1) Insert glazing points or equivalent devices.
- (2) Work the putty to proper consistency.
- (3) Remove the broken glass.
- (4) Apply the putty with a putty knife.
- (5) Measure the opening and purchase the glass.

The best sequence is: (), (), (), (), ().

It will be understood that in some instances more than one sequence may be equally good. Such test items should be avoided unless it is clear that an alternate sequence is acceptable.

A test is *reliable* when it measures with accuracy and consistency what it is supposed to measure. An alarm clock is a valid measure of time, but it is not sufficiently reliable to determine first, second, and third places in a hundred-yard dash. A stop watch is needed for that purpose. Measuring instruments may be valid without being reliable.

In pioneer days land was sometimes measured by tying a rope or chain around a wagon wheel. The revolutions were counted and multiplied by the circumference of the wheel. That, too, was a valid, but not a reliable, measuring device.

A test is *objective* to the extent to which it eliminates subjective judgment in scoring. It is objective when any competent examiner will assign the same score at different times and when different competent examiners will give it the same rating. If the

measuring instrument is objective, it will exclude the personal feeling or disposition of the scorer.

In selecting tests consideration must be given to *economy*. But when that is considered, more than the first cost must be taken into account. A written test is more expensive than an oral one, but it is probably more valid and reliable, and hence more valuable.

Ease of administration must also be considered. Some tests are much easier to administer than others. Objective tests which can be scored with accuracy by the pupils are clearly much easier to administer than the essay-type examination, which must be read by a competent examiner.

"Ease of administration," broadly interpreted, includes the ease with which the test is prepared, given, and interpreted. Some tests, like "multiple-choice," are relatively difficult to prepare but easy to give and to score. Others like the essay type are easy to prepare and hard to score.

12. What to measure. Tests and scales can be made to serve many functions. Among these are:

- (1) To reveal interests.
- (2) To discover aptitudes and capacities.
- (3) To measure achievement.
- (4) To disclose appreciations.
- (5) To determine attitudes and ideals.
- (6) To reveal personality traits and character.
- (7) To stimulate learning.
- (8) To reveal strengths and weaknesses of teaching.

It can be taken for granted that educational tests should reveal knowledges and skills; that they should show the degree of achievement and nature of accomplishments. But tests and examinations must go beyond these. They must collectively give a true pattern of the individual as a whole. Tests and measurements are not adequate unless they disclose functioning data, such as how the individual is able to meet the varying requirements of occupational life and of worthy citizenship.

Tests and measurements should portray the whole individual in action. It is not sufficient to know what information he possesses, what skills he has mastered, and how many tricks of the

trade are at his command. Add to that his intelligence quotient and a measure of mechanical aptitude or some other forms of aptitude, and we still do not have an adequate measure of the individual as a functioning member of a business organization or of a social group. What we want to measure is the *whole* man. Measurement for purposes of improving instruction must go beyond the bounds of subject-matter mastery.

To determine what to measure involves a careful consideration of ultimate as well as immediate goals of instruction. It calls for an analysis of the broad, long-time goals as well as of the specific, day-to-day objectives. All the eight functions that are mentioned in this paragraph—and probably others—are essential factors.

13. How to improve teacher-made tests. In view of the limited space that can be given in this book to testing, the use of standardized tests is not elaborated upon. Instead, some suggestions as to how informal objective tests can be improved are herewith offered.

(1) *Test items should be representative.* Select test items that are *representative* of the masteries that are sought. Give consideration to the whole area of learning to be mastered and determine the relative emphasis that is given to each part thereof. Then select the test items so that the test will be made up of elements that are representative and that reflect such emphases.

(2) *Test items should be clear.* Make each item *clear*. Each statement should be examined carefully to see that it is so worded that not more than one correct answer is possible. This is done by avoiding statements that can be interpreted in more than one way. Check each item to make sure that it does not lead to a wrong concept of what is wanted.

Clearness is furthered by using words that are within the range of the vocabulary of the *learner*, and by avoiding long and involved sentences.

(3) *Test items should be concise.* *Conciseness* is essential. By wording test items concisely, and by arrangements that permit the learner to make his responses with brevity and speed, time is saved. This makes it possible to make the test *comprehensive* in scope.

(4) *Make the test comprehensive.* *Comprehensiveness makes for reliability* in testing. The reliability of a test is not directly proportional to its length. Other things being equal, however, an objective test of seventy-five or one hundred items is appreciably more reliable than one of twenty-five or fifty.

The number of items to be used is determined by the time available for the test and the difficulty of the responses involved. Recognition items, such as true-false statements, are usually easier and consequently take less time than recall items such as: "Who wrote *Vocational Education in a Democracy*?"

(5) *Arrange the items in the test in order of difficulty.* It is good practice to begin the test with items that are easy and to reserve the more difficult ones for the latter part of the test. In the informal, teacher-made test the relative difficulty of the various items can be estimated by the instructor, but the actual differences in difficulty cannot be determined so easily. After a test has been given a number of times, or to many individuals, the relative difficulty can be noted by checking on the number who answered each item correctly.

Placing the easier items at the beginning of the test is helpful in overcoming nervousness. It tends to create a setting in which learners will do their best.

(6) *Test items should be arranged in random or chance order.* Test items should be so placed that one cannot infer from their position whether they are correct or incorrect, true or false. Approximately half of the true-false items should be true and the other half false, but they should be listed in an order that is clearly a random one. One item should not serve to indicate the correct answer to another. Proper directions should be given concerning each type of test item used.

(7) *How validity is increased.* Validity of the teacher-made test is high when the test contains a representative sampling of what the course of instruction covered. A standardized test may be valid in the sense that it measures what it is supposed to measure, but not valid from the pupil's standpoint if the content is foreign to what he was expected to learn. Similarly, the informal test may be technically valid and practically unfair if it measures something other than what was assigned.

(8) *Eliminate useless material from the test.* Avoid items the answers to which are so easy that more than 80 per cent of the class will get them right. Likewise avoid those that are so difficult that less than 20 per cent will get them right.¹ Suggestive statements should not be used. When several options are indicated, each should appear equally plausible or probable. The following multiple-choice item is faulty in that respect: Varnish is thinned with: (a) alcohol, (b) milk, (c) orange juice, (d) turpentine. It would have been better to use these options: (a) alcohol, (b) gasoline, (c) kerosene, (d) turpentine.

(9) *Use statements in positive form.* Statements should usually be in positive rather than in negative form. Both true and false statements can be put in positive form. It is better to have the test item read: "The willow tree is short-lived as compared with the oak" than to put it in the negative form, "The willow tree is not long-lived as compared with the oak." The former way of stating the matter is less confusing.

(10) *Use a key for scoring.* Provide a key for scoring and arrange the test items so that they can be scored quickly and accurately. Many tests can be so arranged that the responses are made at either the left or the right of the page.

Sometimes the learner is asked to underscore the correct response and to place its number in the parentheses provided at the side of the page. This provides a double check.

If a scoring key is to be used much, it is advisable to make it on heavy paper, cardboard, or other strong material.

14. *The true-false test.* A true-false test is a form of objective test in which some of the statements are true and others false. The individual who takes the test is asked to indicate whether each item is true or false. This is commonly done by using some such checking system as: + or -; + or 0; T or F.

The "yes," "no" type of test is merely a variation of the true-false. Sometimes the words are written by the pupil in the space provided, at other times the words are typed and the pupil underscores one, or crosses out one, of the words, as directed.

The true-false test is easy to make and easy to score. It is

¹ Louis V. Newkirk, and Harry A. Greene, *Tests and Measurements in Industrial Education*, pp. 138-9.

probably the simplest and **most adaptable** form of objective tests. It is in common use.

Since persons are often called upon to select the true from the false, experience with this form of test has advantages. Pupils like it. The true-false test is of the "recognition" type which means that the response expected consists merely in determining or recognizing whether the statement is right or wrong.

One of the weaknesses of the test is that one may guess the right answer. To discourage this, some teachers ask pupils not to guess but to mark only the items about which they feel certain. The following formula is sometimes used to correct for guessing: *The correct score* is equal to the number of items answered correctly, minus the number answered incorrectly, divided by two. Or, $S = R - \frac{W}{2}$ where S is the score, R the number right, and W the number wrong.

The following example will illustrate the form in which the true-false test is commonly used.

Directions. This test contains a number of statements, some of which are true and others false. Place a capital T in front of the statements that you think are true and capital F in front of those that you believe to be false. *Do not guess.*

Example. T Mahogany is used for fine cabinet work.

Item	T	F
1.		A screw driver should be sharpened to a chisel point.
2.		A twist drill is used to bore holes in metal.
3.		A Smooth plane is longer than a Jack plane.

15. The multiple-choice test. In the multiple-choice test several choices or options are presented from which the correct response or the best answer is to be selected. It is regarded as one of the best forms of objective tests to use in measuring information and reasoning. The number of responses can be varied

to suit requirements. When four or five responses are given per item, the guessing factor is negligible, provided that all the responses appear of equal likelihood. If the test is to be corrected for guessing, it is desirable to use the same number of possible responses for each item. The formula is this: $\text{Score} = \text{Right} \text{ minus } \frac{\text{Wrongs}}{N - 1}$ where N is the number of suggested responses.

The multiple-choice test is relatively difficult to prepare but its advantages are such as to warrant its wider use. It cannot be used to advantage orally. Neither can it be used to advantage on the blackboard because too much writing is required. It is best used in mimeographed or printed form.

Multiple-choice tests are of several kinds:

- (1) Multiple-response items that call for the best answer.
- (2) Multiple-response items that involve one or more correct answers, each of which is to be indicated by checking, encircling, or underscoring.
- (3) Multiple-response items that contain one correct answer and several confusions or wrong responses.

The directions for the first of these three types may read:

Directions. Each of the following items contain several statements, only one of which is correct. Undercore the correct responses and place the corresponding numbers in the parentheses provided at the left of the page.

Item

1. () Commission men are (1) those who hold commissions in the army or navy, (2) men who aspire to commissions, (3) persons who serve on commissions, (4) men who handle lots of goods or products for sale.
2. () Industrial arts is most commonly taught in grades (1) 1, 2, 3; (2) 4, 5, 6; (3) 7, 8, 9; (4) 10, 11, 12.
3. () The Oswego movement was an outgrowth of the teachings of (1) Pestalozzi, (2) Herbart, (3) Woodward, (4) Leavitt.

16. *The matching test.* The matching test is a modification of the multiple-choice test. Like the latter, the responses may be single words, numbers, or sentences.

In practical arts and vocational education the matching test is used to good advantage to bring out such relationships as those between dealers and products, as is illustrated herewith.

Directions: The words in Column I are related to those in Column II.

Show to which item in Column I each item in Column II belongs by placing the numbers before each item in Column II in front of the correct items in Column I. *Example:* The words "Yates American Machinery" in Column II are related to "Woodworking machinery" in Column I. Therefore, place the figure 6 in the parentheses opposite "Woodworking machinery."

Column I	Column II
() Drafting materials	(1) Stanley
() Art metal	(2) Chandler and Price
() Hammers	(3) Maydole Manufacturing Company
() Printing presses	(4) William Dixon, Inc.
() Woodworking tools	(5) Eugene Dietzgen Company
() Vises	(6) Charles Parker Company
() Woodworking machinery	(7) Yates American Machinery

In the field of tests and measurements the items to be matched could be

() Bernreuter	(1) Mechanical Aptitude Test
() Thurston-Jones	(2) General Intelligence Test
() Stenquist	(3) Spacial Relations Test
() Meier-Seashore	(4) Art Judgment Test
() Otis	(5) Personality Test

17. The identification test. An identification test is one that calls for ability in recognizing objects, parts, forms, structures, and processes. In practical arts and vocational education such tests may take the form of drawings or illustrations of tools, machines, or devices where each part is given a number or other symbol, and where the learner is to name the part and perhaps to state its function.

Sometimes wall charts are used in this way for either group or individual instruction or for testing.

Tools, materials, and other objects may be displayed. Each is given a number and each is to be identified. Samples of cabinet woods serve as a common example of material that can be used effectively in this way.

In the automobile shop, drawings or photographs of various parts of automobiles are commonly used. Every school shop and laboratory can arrange identification tests that will prove interesting and instructive.

18. The recall tests. In the recall type of test the learner must recall or remember the correct response. It differs from the recog-

dition type in that the latter suggests two or more responses, one of which is correct, whereas the recall type does not suggest the answer.



FIG. 40. Using objective standards for measuring accomplishment in industrial arts at San Jose, California. Such objective standards are interesting and distinctly helpful.

The common forms are known as the "single-answer" test and the "completion" test. The single-answer test can be illustrated by these examples:

Directions: Indicate in one word the name of the tool commonly used to:

1. Drive nails _____.
2. Cut lumber _____.
3. Apply paint _____.
4. Cut wire _____.
5. Drill holes in stone _____.
6. Drill holes in metal _____.
7. Measure the thickness of sheetmetal _____.
8. Lay brick _____.
9. Measure bevels _____.
10. Hold round-shank drills _____.

The single-answer test can be adapted to all kinds of subject

matter. Information, relationships, appreciations, and attitudes can be tested by this test. It gives practically no opportunity to guess the correct responses. It can be used for oral as well as for written tests.

Perhaps the greatest weakness in this test is that it is difficult to make it as objective as other forms. For example, item 9 in the preceding single-answer test could be answered in more than one way, depending upon the kind of material or the size of the work involved. One may use the test, however, with satisfactory results on the assumption that the answer will be given in terms of instruction in a given field.

It is possible to word single-answer tests so that each item is objective. To illustrate:

Directions: After each of the following words write the word "soft" or "hard," depending upon which word you believe best describes it.

- | | |
|---------------------|-------------------|
| 1. Balsa _____ | 6. Walnut _____ |
| 2. White pine _____ | 7. Hickory _____ |
| 3. Ebony _____ | 8. Cedar _____ |
| 4. Poplar _____ | 9. Hemlock _____ |
| 5. Bass _____ | 10. Cypress _____ |

The completion test is made up of incomplete statements in which important, or key words, have been omitted. The test appears to be better suited to testing language than other forms of subject matter. A good vocabulary and the ability to phrase uniquely are helpful in taking such tests. E. F. Lindquist says: "The claim has often been made that the sentence or paragraph completion exercise holds the pupil responsible for understanding of a *complete* thought and that it encourages integration of ideas. Its usefulness in this respect, however, has been greatly exaggerated."^{*} He thinks that the completion test, when over-mutilated, becomes a "puzzle" type. The learner may know the answer but may not be able to express it in the form wanted. By way of recommendations he suggests that the direct copying of sentences be avoided since it stresses rote learning; that undue emphasis should not be placed upon unique phrasing when the learner appears to understand satisfactorily; and that only key

^{*} Herbert E. Hawkes (Ed.), *The Construction and Use of Achievement Tests*, pp. 131-32.

words be omitted. The sentences should not be over-mutilated. Enough should be left to represent the equivalent of a direct question or statement.⁹ The following example of completion exercises are taken from a teacher-made test in the field of plumbing.

Directions: Complete the following sentences by inserting the words that appear to be most appropriate.

1. Brass is an alloy of _____ and _____ in varying proportions.
2. Long runs of warm air pipe should be taken off the _____ of the _____.
3. Cast iron pipe is put together with _____ and _____.
4. Pipes on warm air systems are made of _____ tin or of _____.
5. Two of the largest plumbing supply houses in this area are _____ and _____.

19. *Rating scales.* Rating scales are used to increase the reliability of teacher's and pupil's judgments concerning accomplishment. They are also used for measuring personality and character traits, and for judging interests, capacities, and attitudes.

Such traits as industry, accuracy, reliability, cooperation, and initiative can conveniently be rated graphically on the kind of scale prepared by W. Hardin Hughes, of the Pasadena, California, public schools.¹⁰ Similar graphic scales are used for purposes of self-rating as well as for rating others. John M. Brewer's *Self-Measuring Scale for Achievement and Experience in Work and Education* is an example of a rating scale in which an individual rates himself by checking items in the test and by using the method of scoring that has been proposed by Dr. Brewer.

A number of rating scales for judging the quality of workmanship of shop projects were developed in connection with the development of the *Minnesota Mechanical Ability Tests*.¹¹ They consist of a series of exercises or projects which are arranged in order of merit. It is a refined form of the old practice of arranging drawings, shop projects, posters, and the like in

⁹ *Ibid.*, pp. 132-3.

¹⁰ Reproduced in J. Murray Lee, *A Guide to Measurement in Secondary Schools*, p. 146.

¹¹ D. G. Paterson, R. M. Elliott, L. D. Anderson, and H. A. Toope, *Minnesota Mechanical Ability Tests*, University of Minnesota Press, 1930.

an order of merit so that everyone might have such objective evidence as a basis of refining his subjective judgments.

Rating scales naturally vary in value depending upon their validity, reliability, and usefulness. Scales that have been developed scientifically should be better than those that represent the judgment of one or two competent persons. But effective, teacher-made rating scales are by no means uncommon.

A series of exercises or projects that are arranged in order of merit, and that bring out differences in size, shape, and quality, objectively, is distinctly useful as a rating scale. Pupils can be taught to rate their own work more effectively with the aid of such scales. They have diagnostic and instructional values. Pupils can see what constitutes good workmanship, good design, and suitability to purpose when objective, project-rating scales are used.¹²

Pupils are interested in project-rating scales. In the drafting room the pupils may be asked to print the following sentence, which contains all the letters of the alphabet: "The quick brown fox jumps over the lazy dog." The samples can be arranged in order of ascending quality, and they can be mounted as an exhibit or scale to show the difference between good and poor lettering.

School laboratories and shops ought to have many similar devices, for they serve a number of useful functions—namely, motivation, diagnosis, instruction, and testing.

20. How to administer tests. There are certain details of administration that are suggestive to those who give objective tests. These have been well presented by C. H. Smeltzer.¹³ The procedure that he suggests is substantially this:

Have the objective test mimeographed. The pages should be fastened together. An answer sheet, or a sheet upon which the answers are to be indicated, is included.

Ask a student to pass the test material to everyone. Students may begin at once, but they should be cautioned not to place

¹²For a discussion of how to develop a quality rating scale, see Newkirk and Greene, *Tests and Measurements in Industrial Education*, pp. 150-70.

¹³C. H. Smeltzer, "Educational Engineering in Testing and Diagnosis," *Educational Method*, Vol. XII, No. 9, June, 1933.

their name on either the answer sheet or the test. A number may be used instead of the name on the answer sheet.

When the students are at work the instructor steps to the blackboard. In a place where all can readily see he lists numbers from 1 to 75, or as many as the number of items in the test. These numbers are placed in vertical columns with a space following each number. They will be used later for item diagnosis.

At another place the instructor writes a series of numbers, using any desired interval, such as 1, 2, 3, or 5, to record the number of individuals who secured the scores indicated. The blackboard headings will look like this:

Item No.	No. right	Interval	Frequency
1	_____	100-95	_____
2	_____	90-95	_____
3	_____	85-90	_____
etc.			etc.

When three-fourths of the class have completed the test, the work is stopped. Each student is asked to keep the test but to pass the answer sheets to the middle aisle. These papers are then collected and placed in such a way that each row is kept separate.

If there are five rows, the answer sheets may be distributed in the following manner: those from row 1 go to row 3; from row 2, to row 4; from row 3, to row 5; from row 4, to row 2; and from row 5, to row 1.

The next step is to give directions for scoring. The easiest way to mark the papers is to check those items that are wrong. The instructor reads the correct answers.

One member of the class is asked to count the hands of those who have scores of 95 to 100, 90 to 95, and so on. These responses are written on the blackboard under "Frequency." In this way each student will soon learn how he compares with the rest of the class.

Each item may also be examined. When three-fourths of the class miss an item, it is a poor test item. The reason for this failure may be due to a variety of causes. Each student places the score, or the number correct, at the top of the paper.

The frequency distribution is divided into groups that are

given letter grades, such as A, B, C, D, F, or numerical grades, such as 3, 2, 1, 0, -1, or whatever grading system is used.

Each student writes the proper letter or numerical grade above the score on the paper. He also writes the number of the test sheet he holds at the bottom of the sheet to be scored.

Papers are then collected and re-distributed. Students then place their names upon the answer sheets. As the students leave the room they place the answer sheets on one pile and the test sheets on another. The test sheets can be used many times, since no marks or writing is to be made on them.

An answer sheet similar to that on page 447 is used.

In administering standardized tests it is essential to give the test under the same conditions as those under which they were standardized. Instructions for giving standardized tests are usually available through the publisher of such tests.

The attitude and personality of the examiner plays an important role in testing. The attitude of the learner, which is often influenced by the examiner, is equally important. The score made by persons who do not do their best is obviously not a true index of their ability.

In some instances much of the value that comes from testing is lost when the teacher does not personally score the papers. An alternate plan which has many of the advantages of the preceding one is for the students to correct the papers and the teacher to examine each paper afterward. This relieves the teacher of much scoring and yet gives him the first-hand information he needs about each student's paper.

When the tests are scored by the instructor, answer keys and scoring stencils simplify the task of scoring to a considerable extent.

21. **Some tests of special interest to industrial teachers.** It will be our purpose to mention a few of the many tests that are of special interest to teachers of industrial arts and of trade or industrial education. The references must be brief, and it is to be clearly understood that other equally good tests may be available.

(1) *Vocational interest tests.* A vocational interest inventory for men and another for women have recently been developed by

The Pennsylvania State College
Department of Industrial Education

Code Number.....
Test Score.....
Grade.....

SCORE SHEET FOR NEW-TYPE TESTS

Course No. ..Ind. Ed..... Date.....

Student's Name.....

(Do not fill in until told to do so)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170
171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190
191	192	193	194	195	196	197	198	199	200

Illustrating a common form of answer sheet for objective tests.

Cleason.¹⁴ These tests aim to compare the student's vocational interests with patterns of interest which are typical of occupational groups. These tests are for those who are undecided or uncertain as to what vocation they would like to follow.

A manual of directions, including tentative norms for pupils in the junior and senior high school, for college freshmen, and for adults, is available.



FIG. 41 Training chefs at the Central Trade School, Oakland, California.

The vocational interest blank for men and the one for women which Strong developed are widely used.¹⁵ The first of these is intended to reveal how nearly a man's interests coincide with those of the average man successfully engaged in certain occupations. Scoring scales are available for measuring maturity of interest, masculinity-femininity, studiousness, and thirty occupations. The Strong Vocational Interest Blank for Women is built in the same manner as the one for men.

Vocational interests are also revealed, though not measured or tested, by the *Life Adjustment Series* by C. A. Prosser and

¹⁴ Glen U. Cleason, *Vocational Interest Inventory Form A: Men; Form B: Women*. Bloomington, Ill. McKnight and McKnight, 1937.

¹⁵ Edward K. Strong, *Vocational Interest Blank for Men and Vocational Interest Blank for Women*, Stanford University Press

Walter A. Anderson. This series consists of information books and work-books, or practice books, which are based on the principle of learning through doing.¹⁶

Another means of bringing out vocational interests is through John M. Brewer's *Self-Measuring Scale for Achievement and Experience in Work and Education*, previously mentioned.

Dr. Brewer and Mildred E. Lincoln are the authors of: *Vocational Information Test* and another entitled *Educational Information Test*.¹⁷

(2) *Shop tests*. An extensive series of *Shop Tests* have been prepared by William L. Huoter. They include tests in wood-work, mechanical drawing, machine shop, electricity, automobile mechanics, and printing. Although not standardized, they serve well as means of diagnosis.¹⁸

Newkirk and Stoddard have put out a *Home Mechanics Test*, Form A and B.¹⁹ The first part of this test contains a series of procedure exercises. The second part consists of representations of parts of several electrical jobs. The student is required to indicate the proper connections that need to be made.

H. B. Nash and R. R. Van Duzee have issued *Industrial Arts Tests* for junior and senior high schools. Test I—Woodworking; Scales A and D. These tests are designed to test information and to serve diagnostic purposes.²⁰

Many helpful tests of value to shop teachers appear from time to time in the professional journals devoted to practical arts and vocational education. The following three informal tests appeared in the April, 1933, number of *Industrial Arts and Vocational Education*: (a) *Achievement Test in Electrical Science*, by A. Axelrod; (b) *Informal Test in Bench Metal Work*, by T. L. Stanaway, Everett Rice, and Vern Williams; (c) *Mechanical Drawing Tests*, by M. B. Wirth.

A unique *Test by Smell*, by J. Edward Bond, describes how he

¹⁶ C. A. Prosser and Walter A. Anderson, *Life Adjustment Series*, Bloomington, Ill., McKnight and McKnight, 1936.

¹⁷ Published by C. H. Stocking Company, Chicago, Ill.

¹⁸ Published by the Manual Arts Press, Peoria, Ill.

¹⁹ L. V. Newkirk and G. D. Stoddard, *Home Mechanics Test*, Bureau of Educational Research and Service.

²⁰ Published by the Bruce Publishing Co., Milwaukee, Wis.

teaches his pupils to recognize the odor of gasoline, kerosene, alcohol, lacquer, thinner, and turpentine.²¹

Teachers of automobile mechanics will be interested in the non-standardized objective test developed by Garland C. Richardson.²² It contains a total of 72 true-false exercises, 18 multiple-choice items, and 65 of the completion variety.

A test for pupils in upholstery has been published recently. Like most shop tests it is not standardized but is suggestive as a means of diagnosis.²³

(3) *Tests in mechanical drawing.* Among the older published tests that deal with mechanical drawing are *Mechanical Drawing Test*, by D. W. Castle, sold by the Manual Arts Press, and *Mechanical Drawing Test*, by G. K. Wells and M. L. Laubach, published, also, by the Manual Arts Press.

A. J. Badger is the author of *A Standard Test in Mechanical Drawing*, published by the Public School Publishing Company.

A recent informal objective test in this field has been prepared by R. N. Donelson. It is made up of 60 multiple-choice exercises of 5 parts each. The answers are given in a key that accompanies the article.²⁴

(4) *Art appreciation tests.* There are several tests that are of value in judging art appreciation. They include: *The McAdory Art Test*, the *Lewerenz Test in Fundamental Abilities of Visual Art*, and the *Meier-Seashore Art Judgment Test*. None of these tests is designed specifically for testing the kinds of art appreciation most needed in industrial arts education, but they have value in that they bring out qualities not measured by the usual tests in industrial arts.

(5) *Printing tests.* Russell H. Landis has developed a test that measures achievement in printing as taught to beginners. He is the author of *The Construction and Validation of a Printing Test*. The test has not been standardized. It was developed as a thesis at the Iowa State College.

²¹ See *Industrial Arts and Vocational Education*, 25.346-7, October, 1937.

²² Garland C. Richardson, "Objective Test for Auto-Mechanics," *Industrial Arts and Vocational Education*, 25.190-1, June, 1937.

²³ Herbert Bast, "A Test for the Upholstering Department," *Industrial Arts and Vocational Education*, 25.192-3, June, 1937.

²⁴ R. N. Donelson, "Mechanical Drawing Test," *Industrial Arts and Vocational Education*, 26.158-60, May, 1937.

A printing test composed of 100 true-false statements, 75 completion exercises, 27 enumeration items, and 21 multiple-choice exercises has been prepared by Frank Di Giacomo.²⁵

A *Glossary of Printer's Terms*, which is not a test but a useful list of definitions of terms used in the vocation of printing, has been prepared by R. Randolph Karch.²⁶

(6) *Spacial relations test*. Visual acuity and the ability to translate what the eyes see into mental pictures or space thinking are clearly factors in the successful pursuit of many vocations. A test that seeks to measure these qualities will interest industrial teachers. Such a test has been developed by Thurstone and Jones.²⁷

(7) *Rate of manipulation test*. A test designed to select office and shop workers for occupations in which speed of manipulation is important has been worked out by W. A. Ziegler. The test measures "native rate of speed of handwork." The standards of performance in this test were worked out from 2000 cases of both sexes. This test is for individual testing. The equipment required in the *Minnesota Rate of Manipulation Test*, as it is called, is secured through Educational Test Bureau, Inc.²⁸

22. *Purposes of school marks*. School marks serve a number of useful purposes. Among them may be mentioned: (1) to indicate achievement in school work, (2) to motivate learning, (3) to promote desirable competition, (4) to serve as a basis for guidance, (5) to indicate graduation requirements, (6) to indicate the extent of extra-curricular participation, (7) to indicate fitness for higher education, and (8) to indicate suitability for types of occupational life.

There are some who would abolish school marks but that view-point does not meet with great favor. Some feel that pupils should not work for marks, but that a school mark, like a scout insignia, stands for achievement and, like the emblems used in

²⁵ Frank Di Giacomo, "Printing Tests," *Industrial Arts and Vocational Education*, 26:160-2, May, 1937. Published by the author.

²⁶ See the April and May, 1937, numbers of *Industrial Arts and Vocational Education*.

²⁷ L. L. Thurstone and Walter B. Jones. Published by the authors.

²⁸ Educational Test Bureau, Inc., 720 Washington Avenue, S.E., Minneapolis, Minn.

scouting, should stimulate effort and stand for work that has been done.

23. What marks should represent. The chief weakness of school marks is that they stand for too many different things. Teachers are not agreed, and they are not likely to come to a uniform agreement soon, concerning what the school mark should represent.

Some feel that, since the teacher should develop attitudes and ideals as well as knowledges and skills, attitude, personality traits, and character should be elements in school marks. Those who oppose this argue that the school mark should represent two things only, that is, *achievement and ability in the area of learning concerned*. They say that a separate mark—which can be called “citizenship”—should be used to cover personality and character traits. Others respond that this is unsatisfactory; that *too many parents do not concern themselves, seriously, with what their son gets in “citizenship” as long as he brings home good marks in his school “subjects.”*

They maintain that in the world of work a man is not paid for what he knows but for what he does; that perseverance, honesty, cooperation, and the ability to get along well with others are more important than academic achievement, and hence the schools should stress these traits as much as possible, using the school mark as one means of indicating this emphasis.

It is possible, too, that the age of the pupil may have something to do with whether or not effort and attitude should enter into the schoolwork.

Some industrial schools have worked out a marking system which consists in giving marks in the various subject-matter fields based upon achievement. These marks are amplified by a report upon attitude, effort, reliability, and other subjective qualities. This seems to be better than to group these traits under the single head of “citizenship.”

24. Kinds of marking systems. Marking systems may be grouped into two kinds: (a) those that use percentage marks and (b) those that use letters, or numbers, that stand for degrees of excellence.

In the latter group some marking systems use 3, others 4, and still others 5 points in their range of values. Letters such as these are sometimes used: E for "excellent," G for "good," M for "medium," P for "poor," F for "failure." Each of these may have approximate equivalents, as is shown in the following marking system in which

3	is equivalent to	90 to 100
2	"	" 80 to 89
1	"	" 70 to 79
0	"	" 60 to 69
-1	"	" 45 to 59
-2	"	" 0 to 44

One of the difficulties in using the percentage system of marking is that it is quite impossible for the teacher to grade accurately within a few or even 5 per cent. The percentage grade thus leads to wrong notions of reliability.

25. The distribution of marks. In practical arts and vocational education many teachers give relatively high marks and fail few pupils. In language, mathematics, and science about the reverse is often found. It is certain that some teachers are inclined to mark low and others high.

As a means of equalizing these tendencies it has been proposed to use distributions of marks that approximate the normal curve of frequency. If it is granted that this plan has advantages, it is generally recognized that the normal curve should not be applied closely with such small groups as are usually found in high school classes. Neither should it be adhered to rigidly with highly selected groups, such as are found in high school and in college.

Pupils in the senior high school and college students have passed many hurdles—they represent rather highly selected groups.

The curve of distribution, then, should be taken as a general guide rather than a hard and fast formula. It is too mechanical to be used without discrimination. Instead of applying it closely to individual classes, it is better to think of it as a guide for the total number of pupils a teacher has—and then with judgment and discrimination.

26. Some suggested distributions. In a four-symbol distribution the following values have been proposed: A, 10 to 15 per cent; B, 35 to 40 per cent; C, 35 to 40 per cent; D, 10 to 15 per cent.

The five-symbol system of distribution has met with much favor. Among the percentage distributions that have been suggested by writers dealing with this topic, these are fairly representative:

TABLE XI
SUGGESTED DISTRIBUTIONS OF SCHOOL MARKS

	A	B	C	D	F
Missouri Plan.	3	22	50	22	3
Dearborn ..	2	23	50	23	2
Cattell.....	10	20	40	20	10
Finklestein,	3	21	45	19	12
Foster ..	4	24	44	24	4
Odell .	10	20	40	20	10
Odell	7	24	38	24	7

Odell holds that, even though a single fixed distribution is not adhered to closely, it is better to adopt limits within which the distribution of marks should fall. To illustrate: Instead of using either of the five-symbol distributions indicated opposite his name in the distributions just mentioned, Odell believes this to be better: A's, 5 to 15 per cent, B's, 15 to 30 per cent, C's, 25 to 50 per cent, D's, 15 to 30 per cent, and F's, 5 to 15 per cent.²⁹

27. Descriptive standards for rating pupils. There appears to be a growing tendency to define standards of achievement in descriptive terms such as were suggested some years ago by H. G. Masters and C. W. Odell.³⁰

A modification of this general plan has been worked out for industrial arts.³¹ It can be used to advantage in substantially the same form for vocational industrial education.

²⁹ C. W. Odell, *Educational Measurement in High School*, New York, The Century Co., 1930, p. 467.

³⁰ H. G. Masters, "Standards for Rating Pupils," *Journal of Educational Method*, 1: 176-7, January, 1922. See also, C. W. Odell, *Traditional Examinations and New Type Tests*, New York, Century Co., 1928, p. 117.

³¹ Carl R. Peoples, Rock Island High School, Rock Island, Ill.

TABLE XII
THE MEANING OF SCHOOL MARKS IN INDUSTRIAL ARTS

Grades	"A"	"B"	"C"	"D"	"F"
Quantity	Always more than required	Something more than required	Just meets the requirements	Something less than required	Always a below what is required
Quality	Always a better than required	Something better than required	Just meets requirements	Less than requirement	Always a less than requirement
Tools	Repair, replace, sharpen tools	Always careful in repair, replace, and sharpening	Generally careful with tools	Occasionally misuses tools	Continually misplacing, breaking or dulling tools
Material	Conserves material and gets others to do so	Always careful with materials	Generally careful with materials	Occasionally wasteful with materials	Wasteful with materials
Problems Solved	Solves all problems	Solves nearly all problems	Solves only problems in which is interested	Solves only occasional and easy problems	Solves no problems
Attention	Always alert during recitation	Generally alert	Alert when interested	Occasionally alert, generally dull	Always dull in recitation
Promptness	Always prompt in attendance and assignment	Generally prompt and occasionally lets work slide	Just meets requirements	Occasionally fails to meet requirements	Seldom meets requirement
Effort	Always to limit of ability	Generally good effort, occasionally lapses	Sparing in effort	Just meets requirements	Seldom exercises real effort

PRACTICAL SUGGESTIONS FOR TEACHING

By way of conclusion let us briefly note several practical suggestions that may be helpful in teaching.

1. Objective tests are needed to supplement the many subjective judgments that teachers make regarding achievements of pupils.

2. Grades in industrial arts should be based on related knowledge and appreciational understanding as well as on manipulative skill. Objective tests are needed to test comprehensively and with greater validity than is possible through marks based on shopwork and subjective estimates.

3. It is probable that the teacher's mark, based on observation covering a semester, is a more reliable index of mechanical aptitude than the score made by the pupil on any standardized mechanical ability test so far available. But a more valid and reliable measure is secured by using both means of measurement.

4. Teacher-made objective tests can be improved much through a study of how such tests should be developed. A combination of types is more interesting than using one or two types only.

5. It is sophomoric to base school marks upon a rigid adherence to the normal curve of frequency, with small classes and with selected groups.

6. Promotion should be on the basis of achievement and not upon the length of time involved in learning.

FOR DISCUSSION

- 1 Is it desirable to post the grades made by the class in tests and examinations?
- 2 Why are teacher-made tests widely used in practical arts and vocational education?
- 3 Explain the fundamental difference between a mechanical aptitude test and a trade test.
- 4 How does comprehensiveness increase reliability in testing?
- 5 What are the advantages and weaknesses of true-false tests?
- 6 In what ways are multiple-choice exercises superior to true-false?
- 7 Make several constructive suggestions concerning how to phrase objective test exercises.
- 8 What are the chief faults with school marks? How are they remedied?
- 9 How much weight should be given to the final examination in determining school marks?
- 10 Which should receive the greater weight in determining term grades: the daily work or tests?
- 11 What are the arguments for and against using marks expressed in percents?
- 12 Why are many teachers dissatisfied with essay examinations?
- 13 What are the chief differences between standardized and unstandardized tests?
- 14 How necessary or desirable is it to correct for guessing in (1) the true-false test, (2) the three-item response test, (3) the five-item multiple-choice test?
- 15 Compare the opportunities for "cribbing" with essay-type and objective tests.
- 16 Explain in detail how to write an unstandardized objective test.
- 17 Compare the two-point system of marking (passed or failed) with the five-point system.

18. Explain what is meant by: validity, reliability, objectivity, score, grade, aptitude test, diagnostic test, achievement test.
19. What are the chief reasons for giving tests?
20. Distinguish between recall and recognition tests.
21. Describe several types of scoring keys used with objective tests.
22. What are the essential characteristics of a good test?
23. How may the marks given for shop projects be made more objective?
24. Evaluate the practice of using rating scales in teaching: (a) industrial arts, (b) drawing, (c) trades or occupations other than drawing.

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CHAPTER XIX

TEACHING INDUSTRIAL ARTS

METHODS IN "GENERAL" SHOPS AND IN "UNIT" SHOPS

1. Types of shops. Industrial arts shops are of two types—single-activity or *unit shops* and multiple-activity or *general shops*.

In the single-activity or unit shop the instruction is limited to one type of shop activity or subject matter, such as work in wood, or in metal—but not both.

A general industrial arts shop—usually called "general shop" for the sake of brevity—is one in which several types of manipulative work, such as metalwork and electric work, are carried on simultaneously under the guidance of one teacher. The general shop is also called *multiple-activity shop* because several types of practical activities are handled by the instructor. Another name that is used is *comprehensive shop*. This is employed because the equipment includes several types and the activities are varied and comprehensive in kind. The name *composite* is also used.

The ideal industrial arts shop for the small community is the general or comprehensive shop. It is only through multiple activities carried on in such a shop that pupils can get anything approximating a satisfactory course of instruction that will provide the guidance, exploratory, and try-out experiences needed in industrial arts education.

It is certain that the single-activity industrial arts shop is hopelessly inadequate except in the larger districts, or joint districts, where there are a number of different single-activity or unit shops, through which the pupils may be rotated. In such cases, and only in such cases, are unit industrial arts shops satisfactory for exploratory purposes.

The fundamental educational philosophy underlying this form of education is that industrial arts, on the junior high school level

particularly, should be *varied and broad in scope*—representative of the industrial arts as they exist in the world of work in industry and manufacturing. The major objectives of industrial arts were given in the opening chapter of this book and so need not be repeated here.

Usually the smaller school districts have, or should have, general shops; the larger ones usually have series of unit industrial arts shops. Some general shops have long been established in large cities. There is a place for them in large, as well as in small, places.

2. Description of a general shop. As a background for discussing methods and techniques of teaching in the general or comprehensive industrial arts shop, let us describe such a shop.

In area or floor space these shops vary from about a standard classroom size, or approximately 900 or 1000 square feet, to three or four times that size. The minimum size ought to be equal to at least two, and preferably three, classrooms. Current practice allows about 25 square feet of floor space per pupil for classroom instruction. For shop instruction the allowance should be between 50 and 100 square feet per pupil.

One shop, the minimum size of which should be 1320 square feet, will be needed for every 750 pupil periods per week. This is based on a class size of 25 pupils and 30 sixty-minute periods of instruction per week.¹

For ample space let us imagine a shop 24 to 28 feet wide and 75 feet long, with a shop library and planning center added at the side or at one end and a project and materials storage room added on the other end or adjoining one side.

The shop should have equipment for four to eight major types of activities. Those most commonly found are general mechanical drawing, general woodwork, general metalwork, sheetmetal, general electric work, and sometimes elementary automobile mechanics, concrete work, printing, home mechanics, general crafts, photography, hobby activities, and the like. In any event, there

¹ For shop lay-outs of many general as well as unit shops the reader is referred to *Bruce's Specifications Annuals* or the *Industrial Arts and Vocational Education* magazine, both published by the Bruce Publishing Co., Milwaukee, Wis.; and to the *Industrial Education Magazine*, published by the Manual Arts Press, Peoria, Ill.

ought to be facilities for shop sketching and drawing in an adjoining planning center as mentioned, or else in the main part of the shop.



FIG. 42 Views of a well-equipped general industrial arts shop at the Sparks, Maryland, High School. Note the arrangement and nature of the equipment.

The equipment can be arranged in units—wood here, electricity there, molding and the other activities elsewhere.

The work can be planned so that each pupil will have contact with all types of work for which provision has been made. Natu-

rally, they cannot all start with the same activity because the equipment is planned so that there will be enough for only a few students in each activity. Otherwise some of the equipment would stand idle a part of the time. This situation presents the first serious teaching problem.

3. **How to handle multiple activities.** In order that instruction may start well, it is necessary to plan in advance. The teacher should secure information about the maturity, previous experience, and education of the pupils who are to report for instruction. Their home life, their environment, and their avocational interests should be considered in order that the instruction to be given may start with their previous experience and probable present interests as points of departure.

If the work of instruction is to be effective, it is necessary to have a definite, well-considered, practical plan of work. This plan should represent valid goals of instruction for the grade or grades to be served. It must be modified in accordance with the equipment that is available, the funds that may be spent for materials and supplies, and the length of time that is to be devoted to the work. Suggestions for instructional planning are given in Chapter VIII of this book.

It may be taken for granted that the instructor must check tools, equipment, and available supplies thoroughly before the first group meets. He must have a clear idea of how he is going to put his group of pupils to work.

Instruction sheets and other visual-sensory aids are particularly helpful to the teacher who is planning to get four or more activities under way as quickly as possible.

In order to give the learners definite ideas of the standards of workmanship that are expected of them, actual projects made by pupils of the same grade or maturity are helpful.

Such routine duties as issuing tools and materials, keeping records, and looking after other details can be handled by assigning them to pupils, each of whom in turn instructs his successor in the tasks involved.

The problem of what to do for the opening few minutes, while the class roll is being taken or while other duties require a part of the teacher's time, must be met according to the circumstances

that prevail. A suggestion as to how this may be done is given by Noakes.² He recommends: (1) start with something interesting as soon as the class arrives; and (2) provide some worthwhile activity for the class while the teacher takes the roll.

For the latter activity he suggests several problems in mathematics that are related to the type of shopwork that is to be done. Paper and pencils are provided so that everyone can begin promptly.

This suggestion is offered merely as an example of a procedure that, according to the author, has given good results. E. E. Ericson has given good suggestions on what the instructor should do when he first meets the class.³ J. F. Friese has likewise treated the topic. He gives specific suggestions for several successive class periods.⁴ Newkirk and Stoddard have also not overlooked this important problem.⁵ They have made a number of very practical suggestions as to what the teacher of the general shop should do during the opening periods of instruction.

4. Arrangement of tools. The arrangement of tools and equipment bear a close relationship to the amount of checking required to make certain that everything is in its proper place. Tools are commonly kept in (1) toolrooms, (2) on wall tool boards, (3) in wall tool cabinets, (4) in bench cabinets (cabinets under work-benches), and (5) in racks on benches.

Each of these methods has advantages and limitations. In general it is desirable to have the tools arranged in such a way that they can be checked without opening cabinet doors or drawers. In metal shops individual sets of hand tools are often kept in boxes; in wood shops individual tools are often kept on the bench and general tools in cabinets, toolrooms, or on wall boards. Each system should be worked out on the basis of local conditions.

In Philadelphia experiments are under way with general industrial arts shops which are unique in that they provide a series

² Geoffrey B. Noakes, "The Problem of the First Five Minutes," *Industrial Education Magazine*, 33, 211-12, September, 1936.

³ Emanuel E. Ericson, *Teaching Problems in Industrial Arts*, Chapter II.

⁴ John E. Friese, *Exploring the Manual Arts*, Chapter XIV.

⁵ Louis V. Newkirk, and George D. Stoddard, *The General Shop*, Chapter VI.

of a dozen or more one-pupil compartments, each of which is fitted with all the tools needed to carry out a particular type of work. Each work space is also provided with instruction sheets covering the projects which are made. These sheets are mounted and hung where they are readily accessible. When a pupil has completed the units of work in one compartment, he goes to another. In this way he secures contact with a variety of tools and materials.

The compartments are made of pipe uprights with wire mesh panels, most of which extend three or four feet from the floor. The compartments open on the side that faces the aisle.

5. Record systems. Good record systems are indispensable in the general shop. Most of the essential records can be kept by the pupils. Among the most necessary records are those pertaining to: attendance, individual progress, group progress, individual projects, reference material, visual-sensory aids, and inventories of materials, tools, and supplies. Since suggestions concerning record keeping have been made elsewhere in this book, they will not be repeated in this connection.

6. Methods of starting classes. The plans for the first day will depend greatly upon the time that is available, and upon whether or not the shop teacher is expected to secure personnel data at the outset from pupils that report to him.

In some schools the first periods are single periods of about forty-five minutes in length. The teacher is expected to get accurate information about pupils. This is done through personnel cards that are filled out under the guidance of the teacher. A little time is spent in making the most necessary announcements concerning locker space, shop clothing, and safety requirements. The teacher may take the group on a little tour of inspection, the purpose of which is to give everyone an over-view of the shop. Appropriate suggestions concerning tools, equipment, materials, and shop customs are made in accordance with the time that is available. The actual manipulative work is undertaken, in such a case, at the beginning of the second period.

If the shop period should be longer than the time just designated, the class might better be started in one of the following

ways, which are not original with the writer. The plans are used extensively, and have been described before.*

(1) *A series of demonstrations.* In this method of starting the class the instructor demonstrates the first unit of work in each of the activities that pupils will pursue, to all the pupils as a group. If there are four types of work that are to be followed, the teacher gives four demonstrations. Since it may be difficult for the pupils to remember the essential details of all four, they can be asked to take brief notes, or they may be given written instruction sheets that will serve that purpose even better.

Each group of pupils should give special attention to the demonstration that is to aid them in starting their particular type of work. As soon as these demonstrations have been given, and after the most essential information about shop customs has been given, all pupils go to work.

This plan has the advantage that all learners start work at the same time, and that none need wait without having something worth while to do. The disadvantage is that all the class will get several demonstrations that they cannot carry into practice for weeks or even several months. Each pupil, however, will see demonstrated, illustrated, or described, the unit of work that he is to begin during the period.

(2) *Starting with instruction sheets.* A somewhat different plan from the preceding one is to determine who is to begin with the various types of work and to ask him to study the instruction sheets that relate thereto. As soon as a pupil feels that he understands what he is to do, he begins. In some instances written questions must be answered, sketches may have to be made, and cost data have to be figured before the practical work is started. But, in general, each pupil begins as soon as he has given evidence orally or in writing or drawing that he understands his assignment, problem, or project.

The teacher holds himself in readiness to give individual help where it is most needed. Frequently the equipment in one or more of the activities requires closer supervision and more detailed ex-

*S. A. Yager, "Methods of Starting a Class in General Shop," *Industrial Education Magazine*, 38:152-3, May, 1936.

planation on the teacher's part. He therefore plans to distribute his help according to relative need.

Pupils soon learn to be resourceful, for the teacher is not always free to help. In the general shop, where most of the instruction is individualized and where there are a number of types of work, the instructor is kept very busy. So much so that he finds it necessary to put in "extra" time in order to keep the shop in good condition.

(3) *Starting with pupil-selected projects.* This plan differs from the preceding one in that the pupil is not started with an assigned exercise or project, but is asked to suggest his own project and to develop the data needed before the practical work is begun. The selection is either free or controlled. In the latter case, he is given a choice of several things he may do, but he is usually required to make his selection within a specified range. This is often advisable—especially when the instructor does not know how skillful and how reliable and persevering the pupil may be.

By coordinating the work in drafting rooms and shops it is possible to have a pupil make working drawings of shop projects that he will carry out when he gets into the shop. This plan is better suited to advanced, than to beginning, pupils.

Pupil selection of projects has advantages in that it stimulates interest. But unless the instructor is reasonably certain that the learner has the ability to carry out his project, such selection will result in disappointments to pupils as well as to the instructor.

(4) *Using advanced students.* In many industrial arts shops teachers have pupils from more than one grade at the same period. When this is the case, it is easy to divide the class into the required number of different groups and to place an advanced student in charge of the beginners. This device can be used merely to start the class or it can be employed continuously. In the latter case the student leaders or shop foremen are rotated so that as many as possible may secure this leadership experience.

When the class is composed of pupils from the same grade, the instructor selects the most capable ones to act as group leaders. Usually they serve only long enough to start the activities or

until the instructor can take over his functions for the whole class.

Whenever such a plan of student leadership is put into practice, it will be advisable to give these leaders definite instructions about their duties. The leaders must understand that one of their important functions is to see to it that every pupil is fully informed about the accident hazards that may be encountered.

(5) *Variations and combinations of the foregoing plans.* Since local conditions vary greatly, it is but natural that in actual practice different variations and combinations of such plans are used.

One variation from the first plan described is for the teacher to give an explanation or a demonstration, after which that portion of the class which is to follow that type of work immediately proceeds with it. In similar manner the next demonstration or explanation is given, and another portion of the class begins work. This same plan is continued until all groups are started.

Another variation of previously described plans consists in using parts of two or more of them. For example, one or two groups may be started by using job sheets, several others with older or more experienced pupils as leaders, and one or two by directions or demonstrations given by the teacher.

A modified procedure not previously mentioned here is to start portions of the class at different times. Each group can report from their study hall or from the planning center at intervals so that the teacher can give each group his attention as they report for shopwork.

7. *Budgeting instructional time.* If the time to be devoted to industrial arts is to be used to best advantage, the instructor will need to determine the approximate amount of time that can be devoted to each major aspect. Roy G. Fales has suggested that if it is granted that not more than 25 per cent of the total shop time be devoted to related instruction—which means about 10 minutes per 45-minute period—then a distribution which is in line with generally accepted objectives for industrial arts may look like the one shown in Table XIII.*

* Roy G. Fales, "Industrial Arts Teaching Content," *Industrial Education Magazine*, 36:185-91, September, 1934. (Used by special permission of the Manual Arts Press.)

TABLE XIII

A SUGGESTED DISTRIBUTION OF TEN-MINUTE LESSON PERIODS IN INDUSTRIAL ARTS
FOR A UNIT OF 180 PERIODS

Topic	No. of Periods	Topic	No. of Periods
Demonstration of operations, processes, jobs....	90	Economics.....	5
Blue-print reading.....	5	Occupational information	15
Shop sketching.....	5	Mathematics.....	10
Structural and aesthetic design.....	5	History.....	5
Geography.....	5	Science.....	10
Sociology.....	5	Products of industry (consumer values).....	20

The time allocation in Table XIII is for content other than that which comes through manipulative work. The time that is contemplated for manipulative work is approximately three times as great, or as 75 per cent is to 25 per cent.

Each of the topics mentioned by Fales deserves to be emphasized in industrial arts education. It is not contemplated that each be taught as a separate unit but, rather, that all instruction shall be integrated so that the learner will see each part in its relationships to other parts.

When tools, materials, or processes are discussed, a bit of mathematics, history, science, or geography can be interwoven so that the instruction will be richer and more meaningful than it would otherwise be. When practical problems are studied, the social and economic implications of the work can be examined. It is well known that the development of the physical sciences and of technical knowledge has far outstripped our social controls.

8. Pupil management. Pupil participation in school-shop management is provided in general industrial arts shops as well as in those operating on a vocational basis. The general plan has been borrowed from industry. It consists in having an organization which includes a shop superintendent, several shop foremen, a secretary, and other assistants all working under the guidance of the teacher. Carlsen suggests that the shop superintendent be appointed for a period of one week and that he devote his

full time to his duties.* This is contrary to the proposal made by Fales, who thinks that administrative positions held by pupils should be rotated, but *not too often* in the case of the more responsible positions, such as shop superintendent and foremen.



FIG 43. Two additional views of the general shop at Sparks, Maryland.

"Foremen," says Fales, "should have extended experience before being promoted to the superintendency. Not only should they be rotated through several detail jobs, but they should be rotated through all the foremanship positions."[†] The positions to which reference is here made are: (1) production foreman, (2) supply foreman, (3) maintenance foreman, and (4) inspection foreman.

The production foreman can have supervision of such assistants as tool-keeper, safety inspector, progress clerk, and the "contact" man who has charge of publicity and greeting visitors.

*F. A. Carlsen, "Pupil-Foreman Type of Organization as a Teaching Device in the General Shop," *Industrial Education Magazine*, 30 64-74, March, 1931.

[†]Roy G. Fales, "The Pupil-Managed Shop," *Industrial Education Magazine*, 35 7-9, July, 1933.

The maintenance foreman looks after assistants charged with safety inspection, fire inspection, tool maintenance, machine repair, heat, light, and ventilation.

The supply foreman has assistants who look after safety as it relates to this service, others who have charge of inventories, reference books, and periodicals, specimens and visual-sensory aids.

The inspection foreman has from two to five assistants who inspect work. The number that can be used to advantage will depend upon the size of the class, the age of the pupils, and the nature of the work involved.

The foregoing discussion is in line with the thought that pupils can receive valuable experience through participation in supervision and management. By using many assistants, less time per pupil per hour is involved than when fewer assistants are employed. In such a plan the assistants need not be rotated as often as when they devote full time to such service.

The basic ideas underlying plans of pupil participation in supervision in management are: (1) broader pupil development, (2) increased interest, and (3) relieving the teacher of routine work so that he may give more time to instruction.

In Carlsen's article, to which reference has been made, a good description is given of the responsibilities that are assigned to each of the inspectors, foremen, and other pupil-officers. He has included a number of record forms that are of interest to industrial teachers. A daily lesson-plan chart is likewise given. It is of special interest to teachers of general metalwork.

Swain and Karch look upon the school-shop foreman as a distinct help in handling large classes.¹⁰ They, among others, point out that foremanship experiences in school have educational value to those who are given such responsibilities. In order to cope with the problem, which, incidentally, is faced by many teachers, of having to teach over-sized classes, they suggest organizing school-shop foreman's clubs.

In the Arsenal Junior High School, Pittsburgh, Pennsylvania, where some 400 pupils take printing, a foreman's club of 15

¹⁰ Ward W. Swain, and R. Randolph Karch, "School-Shops Foreman's Club," *Industrial Arts and Vocational Education*, 35 3-4, January, 1935.

ninth-grade boys meets once a week during the regular school club time to discuss ways and means of being better school-shop foremen.

The group organizes at the opening of the semester, elects its officers, and develops its standards of work. The teacher serves as counselor and adviser.

9. *How to keep costs low.* One of the problems that perplexes many teachers of practical arts and vocational education is how to operate efficiently at a low cost. Many industrial arts and vocational industrial school shops have been organized in communities that appreciate their advantages but have limited resources. Among the many ingenious ways that are being used only a few representative ones will be mentioned.

(1) *Reducing costs of equipment.* One of the best ways of keeping the cost of equipment down to the minimum needed for satisfactory instruction is to make a careful study of the local requirements and to find out through study, conferences, and first-hand observation how other communities have solved similar problems. In this connection, nearly all the states have supervisors who travel extensively and who are in a position to make helpful recommendations.

If problems of housing and lay-out are involved, the Bureau of School Buildings in the State Department of Public Instruction may also be of assistance.

Many city, county, or district supervisors or directors of industrial education have had extensive experience in selecting and purchasing equipment. They have cost data that will greatly help the prospective teacher or the young supervisor or director who must make the dollar go as far as possible.

In industrial arts—particularly in the general shop—the trend is toward the smaller, lighter, more portable type of equipment. It is lower priced than the heavier machinery, takes up less space, is more economical to operate, and has proved satisfactory. Of course for continuous heavy duty the sturdier type of equipment is best.

Frequently reconditioned equipment may be purchased at reasonable prices. Occasionally local industries have equipment that

they will lend, donate, or sell at nominal or even junk prices to schools.

Some of the smaller items may be made by the school. These items include cabinets, tables, work-benches, chairs, mallets, chisel handles, stock racks, storage bins, drawing tables, shelving, and the like.

If it is not feasible to have pupils undertake many or any of such projects, the Board of Education may save money by employing teachers or other skilled craftsmen to make such equipment when the schools are not in operation.

(2) *Economizing on supplies.* There are many ways where economies can be put into effect in obtaining and using supplies. Most of them are in common practice, for schools usually seek to keep costs low. Economies are brought about by such means as purchasing in large quantities, writing careful specifications and advertising for the lowest bidder, and by standardizing requisitions in so far as it is practicable to do so.

Economies are not always secured by purchasing the lowest-priced materials. Good oil is better than poor. The task is to determine what qualities will serve the purpose. Occasionally a cheaper grade may do, and again it may prove to be a bad purchase. There is always someone who will make a product worse than it has been made before, in order to sell it for less than it can be sold by responsible dealers.

(3) *Methods of preventing waste.* Every experienced teacher has learned how wastes can be kept at a minimum. Pupils can be made waste-conscious. School supplies are usually issued in carefully determined, restricted quantities. To illustrate, in the sheetmetal shop, solder is issued in small quantities as experience has shown that it will "go farther" that way. In the finishing room paints and finishes in small containers are more economical where small quantities are used as spoilage is reduced. In the woodshop sandpaper is issued in quarter- or half-sized sheets unless the work requires large pieces. Lumber is stored according to size and kind and short ends are used.

In the drafting room paper may be purchased in large sheets and sent to the print shop to be cut into smaller sizes. Drawing ink is purchased by the quart or gallon and is issued in small

bottles which are set in stands, often made by pupils, in order that the bottles may not be upset.

Lighting circuits can be arranged so as to economize on electricity. Heat pipes can be insulated; and windows can be caulked.

Self-closing faucets are used to reduce the waste of hot and cold water.

When tool breakage occurs an analysis can be made to determine the cause and to prevent unnecessary damage.

Unless the school law or the policy of the board of education prevents it, pupils may be charged for supplies amounting to more than stipulated amounts.

The kind of damage that is most unfortunate of all—namely accidents resulting in injuries to pupils—can be held down to a minimum through careful instruction in safety practices and through the rigid enforcement of safety regulations.

(4) *Charging for service rendered.* The gross costs of operating school shops may be very different from the net costs. Every school shop or laboratory that renders service to other departments, schools, or the board of education should keep records to show the value of the service that was rendered. Such charges should be made against the person or persons who received it.

When state and federal aid is available for certain kinds of educational service in which the state and the federal government have an equity, that also reduces the cost to the local district.

In keeping records of service rendered the cost of materials should be kept separate from that of the labor value involved.¹¹

10. *Adapting education to the pupil.* We have long given lip service to such slogans as: "Adapt education to the pupil and not the pupil to education." In practice the conventions of the past have made slaves of us. Teachers have long blamed administrators for sending them dull pupils who do not come up to the normal in intelligence and skill. Perhaps no group of teachers have had to face this problem more frequently than teachers of practical arts and vocational education.

¹¹ For other suggestions concerning how to reduce costs of instruction, see: Ross C. Cramlet, and W. L. Hunter, "Operating on a Reduced Budget," *Industrial Arts and Vocational Education*, 23:271-2, September, 1933.

Pupils who are below normal belong in classes for sub-normals. In practice this is frequently out of the question. So, right or wrong, the shop teacher may have several such pupils left to his care. What should he do about it?

The key to the solution lies in adjusting the instruction to each such individual rather than in trying to adjust such an individual to the standards set for average and superior pupils.

The fact that much of the instruction is individual makes it easier to make such adjustments in the school shop than in the classroom. This, however, does not justify the practice of placing weak with average and superior pupils.

Many pupils of low mentality are able to learn to do some kinds of work reasonably well. The problem is to find out what they can do and to develop such abilities to the end that they may become self-respecting and self-supporting members of society. The try-out exploratory experiences of the industrial arts shop and the more specialized ones of the trade class will help many.

11. Industrial arts for girls. In elementary industrial arts girls and boys undertake class projects and work together very effectively. But by the time they get into the junior high school the girls usually take courses in home economics and the shop classes are usually for boys only. Here and there girls are being offered the opportunity to take industrial arts just as boys are getting classes in "camp-cooking."

The nature of the shopwork given to girls in junior and senior high schools is such as will develop consumer appreciations and also give them familiarity with the phase of industrial arts commonly called "home mechanics."

Girls are also interested in industrial arts because it opens new areas of hobby activities to them. Experience has shown that they are capable of doing superior work in the skilled crafts. Art metalwork, leather work, ceramics, photography, drafting, and design are but a few fields of work in which girls may do quite as well as boys.

Girls also do good work in wood—particularly in the smaller projects which do not require heavy muscular work. Wood fin-



FIG. 44. A class of girls receiving instruction in industrial arts at Augusta, Wisconsin. This view shows them making and upholstering furniture.

ishing and refinishing appeal to them, and they have practical possibilities for later years. Upholstery, caning, and weaving have possibilities.

In the field of electricity, girls are usually given experience with home electrical appliances. Each appliance is studied as to its construction, and the girls are shown how to "check trouble" and to repair the appliances. Among the more commonly studied types are electric irons, food mixers, vacuum sweepers, fans, washing machines, hair curlers, door-bell and buzzer systems, and extension cords. Closely related to these is instruction in replacing burnt-out fuses, in reading electric and gas meters, and in preventing short circuits.

Interesting projects in making and decorating electric lamps can be worked out by girls. Many different kinds of materials are employed. Historical study of styles of lamps may be undertaken. Home lighting and the selection of suitable lighting fixtures for all parts of the home also offer possibilities.

Instructional units for a year's work in industrial arts for

girls were developed by H. C. Rose.¹² They include identification and characteristics of common woods and wood substitutes, of common tools and various forms of fasteners and hardware; the preparation of glue, the identification and use of upholstery materials, and the use of patterns and templates. Principles of design and surface decoration were studied. Wood finishing and refinishing were taught. Incidentally the girls learned how to care for paint and varnish brushes. Elementary drill in the use of drawing instruments was given. Home planning was discussed. Architectural design was considered. Landscape architecture was studied with reference to beautifying home grounds, and home electrical appliances came in for their share of attention.

12. Occupational adjustment for girls. Many girls and women are employed in rather highly specialized work on power machines or near them. It is claimed that the accident rate is higher among such workers than it would be if the girls were not afraid of the machines. With this in mind "general vocational courses" are being established which seek to familiarize workers and prospective workers with common tools and machines in order to make such individuals more employable. Obviously experience with power machinery under competent teachers is a good way to help many persons in occupational adjustment.

13. The industrial-arts laboratory plan. The Board of Education, Chicago, Illinois, under the immediate direction of Louis V. Newkirk, Director of Handwork, and research assistants, is developing what they choose to call the Industrial-Arts Laboratory.

Its purpose is to interpret the modern world of industry, manufacturing, and trades to ninth-grade boys in the academic high schools of the city. If an analogy is permitted, the industrial arts laboratory is to the study of the industrial world of work what general science is to the study of the physical and biological sciences.

The course is one based on learning through doing. About four-fifths of the time is given over to manipulative work, and addi-

¹² H. C. Rose, "Industrial Arts and the Girl," *Industrial Arts and Vocational Education*, 21, 292-4, October, 1933.

tional time is spent in visits to industry, related reading, and learning by means of visual aids.

Expensive machinery is not used and economies are effected in avoiding the purchase of expensive materials. Pupils get instruction in the laboratory for a double period, five days per week for two semesters.

Five such industrial arts laboratories were in operation in 1937. The instruction is given in one or more rooms and by one or more instructors, depending upon facilities and numbers to be served.

Analysis charts have been prepared for each of the following eight areas of instruction.

- | | |
|-------------------|-----------------|
| 1. Planning | 5. Ceramics |
| 2. Metalwork | 6. Textiles |
| 3. Transportation | 7. Graphic arts |
| 4. Housing | 8. Electric |

Instruction sheets are being developed to supplement the graphic analysis.¹³

14. **Correlation with other areas of learning.** A quarter of a century ago America's foremost molder of thought in industrial arts education, Frederick G. Bonser, indicated the desirability and the need for correlating the manipulative work in industrial arts with other areas of learning.

More recently the Teacher-Training Committee of the Oregon Principals' Association has recognized desirable combinations between industrial arts and other subjects. On the basis of interest value to the teachers and probable correlations in schoolwork, the following correlations are suggested by the committee:¹⁴ the correlation of industrial arts and (1) general science, (2) industrial arts and physics, (3) industrial arts and mathematics, (4) industrial arts and social studies, (5) industrial arts and biological sciences, (6) industrial arts and physical education.

It is believed by the committee that these groupings are arranged roughly in the order of preference reported by teachers.

¹³ These charts are reproduced in "The Industrial-Arts Laboratory," by Louis V. Newkirk, Colman Hewitt, and R. T. Hunter, *Industrial Arts and Vocational Education*, 26 69-72, March, 1937.

¹⁴ *State Course of Study, Industrial Arts, for Oregon Secondary Schools*, pp. 14-15 State Department of Education, Salem, Oregon, 1937.

15. **Methods of instruction suited to industrial arts.** Good teaching in industrial arts, as in other fields of education, calls for familiarity with many methods and techniques of teaching. But if one method may be singled out for special emphasis, it should be the project method. Much of the instruction in industrial arts should *converge* about the project method. Pupil purposing, planning, executing, and judging should hold the *center* of the stage. Demonstrations, illustrations, informal discussions, and learning through doing should be stressed. They are supplemented by other techniques that have been discussed in other chapters. A rich source of reference material is issued by manufacturers and dealers. Visual and sensory aids of many kinds can be had at low cost.

16. **Home mechanics for boys and girls.** "Home mechanics" refers to that part of industrial arts education that centers around the repair and construction work that is commonly done around the home. Girls as well as boys are interested in it.

Home mechanics can be organized as one of the units of the general industrial arts shop. The tools and equipment should be representative of what is, or should be, used in the home.

The content of the work given should be representative of the construction and repair work that men and women do in maintaining their home. Naturally this varies greatly, depending upon aptitudes and interest. Among the kinds of jobs that are frequently performed at home are:

- (1) Replacing washers on faucets and on toilet supply valves and adjusting floats on toilets.
- (2) Cleaning traps on kitchen sinks.
- (3) Reglazing broken windows in wooden and in metal frames.
- (4) Waxing, staining, varnishing, enameling, and painting floors, walls, furniture, and the like.
- (5) Repairing cracked plaster walls, cement floors, and repointing brick and stone work.
- (6) Refinishing metal surfaces, such as those on furnaces, fire-place screens, roof gutters, and downspouts.
- (7) Building trellises, arbors, garden seats, and porch furniture.
- (8) Repairing leaks in roofs of wood shingles, composition shingles, asbestos, and slate.
- (9) Fixing sticking or loose windows and doors and raising or

lowering the strike-plates on doors so that they will close and lock properly.

- (10) Building shelves, cabinets, bookcases, flower stands, flower boxes, and the like.
- (11) Repairing electrical appliances, utensils, tools, and toys.
- (12) Repairing and refinishing furniture. This includes upholstery, weaving, and caning.
- (13) Laying linoleum and other floor coverings.
- (14) Making and placing window and door screens.
- (15) Making stakes and various forms of support, for flowers and vegetables.
- (16) Providing accommodations for pets.

17. **General mechanical drawing.** For some time many persons have felt that the mechanical drawing which is given to pupils in general industrial arts shops and in the junior high schools should be less specialized than has been the usual practice. In response to this demand text and reference material is being developed for *general mechanical drawing*.

The Detroit Public Schools, among others, have issued an outline of a course of study that is distinctly suggestive.¹² This course has been prepared for eighth- and ninth-grade boys in the practical arts curriculum. It is based on a time allotment of three 60-minute periods per week for each semester. The purpose of general mechanical drawing is stated by Kepler in the following manner: (1) "To give pupils a better understanding of the materials, machine processes, organization and inter-relationships of commercial and industrial life; (2) to provide contacts with, and information about, drafting and dependent occupations; (3) to offer an opportunity to use drafting tools and materials as a means of concrete expression, and as a means of discovering aptitudes and interests; (4) to develop the ability and habit of using drawing in planning and clarifying ideas pertaining to the construction of machines, tools, buildings, and other structures, and (5) to develop an appreciation of the value of a knowledge of mathematics and shop practices as applied to drafting room work."

A suggested class organization is described by F. R. Kepler in

¹²F. R. Kepler, *Outline of Course of Study in General Mechanical Drawing—Intermediate Schools*, Board of Education, Detroit, Mich., 1933, 54 pages mimeographed.

this same Course of Study Outline. It calls for (1) engineer—the teacher, (2) chief draftsman, who is elected by the class from qualified nominees approved by the instructor, (3) assistant chief draftsman, who is elected in a similar manner, (4) checkers, as many as are needed, who are appointed by the chief draftsman, with the approval of the instructor, (5) clerks, who are appointed by the assistant chief draftsman with the approval of the teacher.

18. The general and unit shop compared. A major portion of this chapter has been devoted to discussing the general or comprehensive shop. This was done because it is less well understood than the single-activity type of shop, known as the "unit" shop.

In the unit shop the instructor becomes more of a specialist than is possible in the general shop. He can study more intensively and can follow with greater concentration the more limited, though amply wide, range of learning that comes within his area of special interest. Since he can concentrate on one instead of on four or six types of industrial arts education, it may be assumed that he ought to be more expert in his work than the instructor who teaches the general shop. Although this may be true, it must be admitted that there are also advantages as well as limitations to teaching a number of types of work. Variety is stimulating and energizing. The various knowledges, skills, and appreciations that come through shop instruction in different materials can probably be correlated more effectively by one good teacher in the general shop than by several teachers, each handling one activity.

Teaching methods in the two types of shops are essentially the same, though differing in minor details because of the differences in layout and equipment.

The broader goals or desired outcomes in the general and the unit industrial arts shops are identical. Instruction received through a series of unit shops is intended to give the same range and scope that is offered in the general shop.

In some of the cities or school districts employing as many as six industrial arts teachers, the pupils may have a schedule like that shown in Table XIV.

TABLE XIV

REPRESENTATIVE SCHEDULE FOR INDUSTRIAL ARTS IN GRADES 7, 8, AND 9

Grade	Type of Industrial Arts	Time in Weeks
Seventh	Home mechanics	18
	General mechanical drawing	18
Eighth	General woodwork	18
	General electricity	18
Ninth.	General metal.	18
	Graphic arts	18

19. Types of shop units. The following units of instruction have been suggested by a state department of public instruction for pupils fourteen years of age and over.¹⁶

Automobile units

- 1 Disassembling and assembling automobile parts
- 2 Mechanics of automobile operation
3. Automobile drivers' laws and rules
4. Automobile repair and maintenance
- 5 Applied theory (materials and methods used in the industry)

Drawing units

1. Instruction in reading drawings
- 2 Sketching and drawing related to shop activity
3. Applied mechanical and architectural drafting
- 4 Industrial applications of design and drafting

Electrical units

1. Wiring
 - a Bell wiring
 - b. Light and power wiring and distribution
 - c. Underwriters' rules and regulations
 - d. Applied theory (materials and methods used in the industry)
2. Communication
 - a Telegraph, telephone, radio
 - b. Transmission

¹⁶ *Industrial Arts Education*, issued by the Commonwealth of Pennsylvania, Department of Public Instruction, Harrisburg, 1935.

- c. Federal, state, and local rules and regulations
- d. Applied theory (materials and methods used in the industry)
- 3. Motor and generator
 - a. Motor and generator repair
 - b. Motor and generator installation
 - c. Underwriters' rules and regulations
 - d. Applied theory (materials and methods used in the industry)

General metal units

- 1. Machine shop practice
 - a. Bench-work (to include wrought-iron work)
 - b. Machine tool operation
 - c. Applied theory (materials and methods used in the industry)
- 2. Sheetmetal
 - a. Bench-work—tin, galvanized iron, black iron, and art metal
 - b. Applied theory (materials and methods used in the industry)
- 3. Forging
 - a. Rough forging
 - b. Ornamental forging
 - c. Applied theory (materials and methods used in the industry)
- 4. Welding
 - a. Electric
 - b. Acetylene
 - c. Applied theory (materials and methods used in the industry)
- 5. Metal molding (art metal and parts for machines and apparatus)
 - a. Core making
 - b. Molding from patterns
 - c. Heating and pouring metal
 - d. Applied theory (materials and methods used in the industry)
- 6. Plumbing
 - a. Cutting and threading pipe
 - b. Welding as applied to the industry
 - c. Installation and repair of plumbing accessories
 - d. State and local rules and regulations
 - e. Applied theory (materials and methods used in the industry)

Printing units

- 1. Composition (newspapers, hand bills, pamphlets, books, advertising, cards, etc.)
- 2. Press work
- 3. Bookbinding
- 4. Art as applied to the industry
- 5. Applied theory (materials and methods used in the industry)

Woodworking units

1. Carpentry
 - a. Bench-work
 - b. Model building and practice jobs based on pupil interest
 - c. Sectional building on reduced scale
 - d. Machine tool operation
 - e. Applied theory (materials and methods used in the industry)
2. Cabinetmaking
 - a. Bench-work
 - b. Practice jobs and productive work
 - c. Finishing
 - d. Machine tool operation
 - e. Applied theory (materials and methods used in the industry)
3. Patternmaking
 - a. To include both wood and metal
 - b. Bench-work
 - c. Practice jobs and production work
 - d. Machine tool operation
 - e. Applied theory (materials and methods used in the industry)

Other units, such as weaving, ceramics, cement work, and jewelry, are possibilities for additional development.

The Committee Report of the American Vocational Association, entitled *Standards of Attainment in Industrial Arts Teaching*, contains a series of eleven learning or teaching units, each of which is given in considerable detail.¹⁷

The major portion of the Oregon Course of Study for Industrial Arts, to which reference has been made in this chapter, is given over to a presentation of well-developed units of instruction, to suggestive references for these units, to equipment lists, and to selected bibliographies.

PRACTICAL SUGGESTIONS FOR TEACHING

And now, in the light of the preceding discussion, the following points are suggested:

1. It is not a question of which is better, the general or the unit shop, but of which is best suited to the specific, local conditions and requirements.

2. Teaching situations seldom come in the simplified form

"See "For Supplemental Reading" at end of chapter.

in which they are usually discussed in textbooks. Every situation has conditions and restrictions as well as opportunities for betterment.

3. Teachers of home economics have been more active in offering "camp-cooking" for boys than the men have been in making available industrial arts for girls. One is as necessary as the other.



FIG. 45. A view of foundry projects, cast in aluminum, made in the Sunbury, Pennsylvania, general shop under the direction of Wayne E. Steiner.

4. Teaching time must be budgeted with reference to the time available in the curriculum as well as with reference to what needs to be taught.

5. Many people still confuse a general wood shop or a general metal shop with a general or comprehensive industrial arts shop—a general wood shop is merely one common form of unit shop.

6. If industrial arts is to serve try-out, exploratory, guidance, and appreciational purposes, it must not be limited to a few types of experience. We need to broaden and enlarge the scope of the work that is given by adding numerous supplementary activities.

FOR DISCUSSION

1. Should industrial arts be available to girls? Why?
2. What are the chief purposes of industrial arts in secondary schools?
3. Should communities requiring more than three industrial arts shops establish unit shops? Explain.
4. What is the approximate range of cost of equipment for a general shop?
5. Which costs more: a general shop or a unit shop? Why?
6. Describe: (1) a general metal shop, (2) a general electric shop, (3) a general wood shop, (4) a general graphic arts shop, (5) a general shop.
7. How many major units of subject matter should be provided in a general shop? Justify your answer.
8. Distinguish between: (1) individual and (2) general shop equipment.
9. What are the advantages and the limitations of having industrial arts classes make shop equipment?
10. To what extent and under what circumstances do you favor pupils making shop equipment?
11. Describe the differences between general mechanical drawing and the usual course in mechanical drawing.
12. Why give general mechanical drawing?
13. To what extent should craftsmanship be stressed in junior high school industrial arts?
14. Approximately what proportion of the instructional time should be devoted to: (1) manipulative work, (2) group discussions and demonstrations, (3) visits to industry? Justify these answers.
15. Does emphasis on tool skills in industrial arts make the instruction vocational? Explain.
16. Compare the objectives of: (1) manual training, (2) manual arts, (3) industrial arts.
17. Make detailed suggestions on how to start a class in a general industrial arts shop.
18. Explain how to correlate industrial arts with: (1) mathematics, (2) physical sciences, (3) social sciences, (4) English, (5) history.
19. Mention several teaching devices that are well suited to industrial arts.
20. Explain how visual-sensory aids can be used to make industrial arts instruction more interesting and helpful.

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CHAPTER XX

ADULT EDUCATION

PRINCIPLES, METHODS, AND TECHNIQUES

1. The meaning and need for adult education. The term "adult education" is a broad, generic one. According to the older meaning of the term, adult education was primarily a means of supplementing some of the learning that was missed during youth. The modern interpretation of the word is much broader. We now think of adult education as *a means for continuing growth* in manipulative skill, intellectually, emotionally, morally, and spiritually, long after evident physical growth has ceased.

Adult education now seeks to prepare people for the broader task and the wider possibilities of active development and growth in many different ways during the relatively long span of maturity.

A commonly accepted definition of an adult is "one who has reached majority" and "one who has grown up." For our purposes we shall think of him as one who has left the full-time school in order to participate in activities lying largely outside of school. From this point of view young folk who have secured, or who are seeking, employment and who are still attending part-time school classes are adults, as well as persons who have long left school and who are of legal age and over. When an individual leaves the full-time-preparation-for-life stage to enter upon that period when he, to a large degree, pursues activities of grown folk, he comes within this classification.

Adulthood is not alone a matter of physical growth, or of mental development, or even of legal voting age. Not all adults enter the realms of the serious work so necessary to civilization, but it is believed that participation in work activity is what we should normally expect of all able-bodied adults. We think of the boys in the C.C.C. camps as adults; likewise young folk em-

played on work certificates are to be looked upon as young breadwinners, as taxpayers, as adults.

Fundamentally the need for adult education has its roots firmly grounded in the need for continuous individual growth. Modern life demands this. A fast-changing social and economic order makes it imperative. Democratically conceived ideals of education call for constantly evolving, cooperative effort on the part of all intelligent persons.

Vocational industrial adult education is, of course, directly concerned with increasing the vocational competency of workers in the trade or industrial pursuits. The need for training, for re-training, and for frequent job readjustment is too apparent to call for proof. The fact that the people of America have often expressed, through legislative and other ways, their strong faith in vocational adult education, is cited as but one index of wide public support and recognition of need.

Industrial arts education, on the adult level, aims to open up new avenues of creative endeavor largely followed in the spirit of vocational interests and hobbies. That there is increasing need for this is a commonplace. The shortened hours of employment, the specialization, routinization, and repetition in occupations, and the high pressure of modern life call for a return to creative work done in the spirit of the artist-craftsman. For the white-collar worker, in particular, the home work-bench, the community club work room, or the school shop bench serves as a means of enriching and vitalizing life.

The weak and the strong, the handicapped and the sound, the poor and the wealthy, the uneducated and the educated, each and all find pleasure, assistance, and satisfaction through industrial adult education.

2. The scope of adult education in the United States. The whole civilized world believes in adult education, and has had faith in it for untold ages. In the past such education has been almost exclusively of the informal type. More recently this informal and frequently incidental adult education is being supplemented by definitely organized instruction.

Vocational education for adults was undertaken in the United

States under the Land Grant Acts and supplementary acts of Congress. The Smith-Lever Act of 1914, otherwise known as the Agricultural Extension Act, enabled the states to develop an adult education program of large proportions. This was followed by the Smith-Hughes Act of 1918, under which a half million or more adults are getting instruction.

More recently the George-Deen Act was passed, under which still broader programs are expected to develop. The various states have additional provision for adult education of many kinds not provided for under the national acts just mentioned. Local communities and private, semi-private, and public agencies of many sorts are interested in adult education. A few of the countless forms of adult education are given in the following table.

TABLE XV
REPRESENTATIVE FORMS OF ADULT EDUCATION

1. Agricultural extension	13. Men's and women's clubs
2. Private correspondence schools	14. Adult education for the foreign born
3. Vocational classes	15. Parent education
4. Non-vocational classes	16. Lyceums and chautauques
5. Open forums	17. Music
6. Library service	18. Museums
7. Corporation schools	19. Programs through religious groups
8. The radio	20. Education for the unemployed
9. The press	21. Emergency education
10. The movies	22. Workers' education
11. University extension	23. Rehabilitation
12. Recreation	24. Civilian Conservation Corp

Adult education is essentially a part of life—not an academic abstraction. It is used by all sorts of people in many sorts of ways to supplement and extend knowledge, skills, appreciations, insights, and understandings.

In a study of representative cities in one state it was found that there are more adults who are enrolled in one or more classes in the public schools than the number of girls and boys registered in the high schools of those same cities.¹

Dr. John W. Studebaker has said that open forums have doubled in the United States in the four years following 1929. Thousands of adults are taking correspondence courses, are en-

¹ A. W. Cattle, *Journal of Adult Education*, p. 305, June, 1933.

rolled in the Civilian Conservation Corp, and are receiving instruction under the Emergency Education Program.

3. Agencies for adult education. The most comprehensive programs of systematic, organized adult education are sponsored through the cooperation of federal with state and local agencies. These include (1) agricultural and homemaking extension under the Smith-Lever Act, (2) vocational education in agriculture, homemaking, trades, and industries under the Smith-Hughes Act, (3) civilian rehabilitation under the Federal Act of 1920, (4) vocational distributive education and other forms of vocational education under the George-Deen Act of 1936.

There are in the neighborhood of two hundred national associations in the United States, each of which is interested in

TABLE XVI

SOME NATIONAL ASSOCIATIONS INTERESTED IN ADULT EDUCATION

1. American Association for Adult Education
2. American Association of University Women
3. American Bar Association
4. American Council on Education
5. American Farm Bureau Federation
6. American Federation of Labor
7. American Home Economics Association
8. American Institute of Architects
9. American Institute of Banking
10. American Legion
11. American Library Association
12. American Management Association
13. American Municipal Association
14. American National Red Cross
15. American Physical Education Association
16. American Vocational Association
17. Chamber of Commerce of the United States
18. Commission on Jewish Education
19. Daughters of the American Revolution
20. General Federation of Women's Clubs
21. National Congress of Parents and Teachers
22. National Education Association
23. National Grange of the Patrons of Husbandry
24. National Recreation Association
25. National Vocational Guidance Association
26. Rotary International
27. Young Men's Christian Association
28. Young Women's Christian Association

adult education. A few of the more familiar associations include those shown in Table XVI.²

In addition to national associations there are numerous state associations which are interested in such special phases of adult education as fireman training, education for municipal employees, training for peace officers, and the like.



FIG. 46. Harry Taylor, Assistant Director of the Emergency Conservation Work, Washington, D. C., gives a demonstration on a lathe to a Civilian Conservation Corps group at Williamsport, Pennsylvania.

Probably, still more numerous, are local organizations that are not affiliated with state or national associations.

4. Public attitude toward adult education. There is every indication that the United States is fast becoming adult-education minded. The researches of Edward L. Thorndike and others have provided scientific evidence showing conclusively that adults can continue to learn until senility sets in. He has shown that, whereas children are superior to adults in rote memorization, adults have the advantage when discriminating thinking and complex reasoning are involved.

²For descriptions of these and other national associations, see *Handbook of Adult Education*, American Association for Adult Education, 1934

Not so many years ago many people were of the opinion that public responsibility for education did not extend beyond those twenty-one years of age. Now state school laws have been broadened to include adults of all ages.

It must be recognized, however, that most adult education is, and should be, informal in character. The opportunities for developing informal adult education through open forums and other means are as yet practically untouched. Dr. John W. Studebaker has said that, whereas the experimental open forums have grown fast, yet they have attracted not more than 10 per cent of the adults in the places where they are in operation.

The further development of adult education is largely a matter of training competent leadership. In this broad, challenging program teachers of industrial arts and of vocational education will want to assume their share.

5. Types of adult education. Adult education is of two main types: *informal* and *systematic* or *organized*. Much of the informal adult education is in the form of self-improvement in such areas of experience as travel, literature, music, social welfare, economics, and vocational work.

Another form of informal education relates to hobbies and avocational interests. Sports, recreation, and amusement are other forms.

The systematic, organized or "formal" types of adult education are illustrated by courses of instruction given through correspondence, home-study, extension, and residence classes as sponsored by public and private agencies.

Adult education may also be classified as (1) vocational and (2) non-vocational. The former is illustrated by various forms of part-time, evening, and slack-season instruction given to increase vocational competence or for those unemployed or about to become so. The latter is exemplified by general cultural and practical arts courses that are taken for purposes of exploration, try-out, guidance, and general enrichment of life.

6. Methods of adult education. Underlying methods of teaching there must be an understanding of adulthood. It would be disastrous for a teacher of adults to attempt to handle adults like adolescents. Adults go to evening and part-time schools and

classes for definite purposes. It is granted that many of them start with false notions about modern school practices, but, if so, they are willing to modify them. Experience in industry and business has taught them to expect change and to adapt their thinking to truth however it may be revealed.

Adults want to be respected for what they have accomplished. This is due them. They want to be challenged with something worth their mettle. They are not playful children, or are they seeking the lines of least resistance. The teacher does not need to urge them to study or to work with their hands and intellect, for they have definitely come for that purpose.

Adults deserve to be treated like grown-ups. They must not be looked down upon. Sympathetic understanding is needed, but neither assumed superiority nor an attitude of condescension is in order.

One of the essentials of teaching is to express thoughts so that the learner will understand. Many adults talk in vernacular. They do not understand the pet system of names or professional nomenclature of college-trained teachers. Therefore, one of the requirements for a successful teacher of adult education is the use of language that the learners understand.

Among the methods employed in adult education may be mentioned:

TABLE XVII

METHODS USED IN ADULT EDUCATION^{*}

- (1) Lecture by one individual on a subject
- (2) Symposium or lectures by several individuals on one subject
- (3) Open forum; lecture plus discussion
- (4) Panel procedure
- (5) Round table procedure
- (6) Individual reading and study
- (7) Recitation
- (8) Questions
- (9) Demonstration
- (10) Illustration
- (11) Individual instruction on the job
- (12) Project method
- (13) Correspondence
- (14) Apprenticeship

^{*} See alphabetical index for detailed discussions of these methods.

In many occupations, indirect methods of learning are still practiced. The "helper" eventually learns the trade or occupation. Of course such methods are very wasteful.

For the skilled trades apprenticeship is the most common form of preparation. Sometimes written indentures are used but more often they are not. There is a distinct tendency for employers to share the responsibility for apprenticeship education with the public schools. Usually industry provides all or most of the instruction in the practice of the trade and the schools supply a large share of the instruction in the related subjects, such as related mathematics, science, drawing, and trade theory.

7. Special methods for experienced persons. One of the most popular ways of training experienced adults for instructional, supervisory, and administrative positions for industry is through the conference technique which was dealt with in Chapter XI. This same technique has also proved most helpful for instructing firemen, peace officers, and custodians.

Although a discussion of how to use the conference technique will not be repeated here, it may be of interest to examine the kinds of topics that are commonly used in training foremen through the conference technique. The following table gives a list of suggestive topics.

TABLE XVIII

SUGGESTIVE TOPICS FOR FOREMAN TRAINING

1. Analyzing your job.
2. Cooperation: how to secure it.
3. Carelessness: how to recognize and prevent it.
4. Care of materials, supplies, and equipment.
5. Departmental and inter-departmental relationships.
6. Discharge or transfer?
7. Foreman as supervisor: getting out production.
8. Foreman as manager: keeping down costs.
9. Foreman as instructor: teaching men on the job.
10. Labor turnover.
11. Leadership: good and poor.
12. Open-mindedness: its value in industry.
13. Promotion: standards and policies.
14. Securing and using suggestions.
15. Teaching versus bossing.
16. Waste: how to prevent it.

When larger groups are involved some such technique as the open forum may better serve the purpose. There are distinct advantages, however, in keeping the group below twenty-five in number if each individual is to have the opportunity to participate.

At the seventeenth annual conference of the Southern regional meeting held under the auspices of the United States Office of Education, Vocational Division, it was brought out that the following ten special methods of training are used with experienced adults who are preparing for supervisory responsibilities.⁴

- (1) Preparation of committee reports worked out by consultation of original source material and by the conference method.
- (2) Individual reports from selected readings from various authorities.
- (3) Practice in preparing type job analyses, lesson-plans, instruction sheets, test questions.
- (4) Practice in conducting conferences, planning auxiliary material in advance, and making reports at conclusion.
- (5) Practice in making promotional talks for advocating some specific class.
- (6) Practice in interviewing persons in trade and industrial occupations for purpose of securing necessary information for organization of trade classes.
- (7) Practice in the preparation of questionnaires for securing information.
- (8) Practice in writing reports of activities.
- (9) Practice in writing articles for publication.
- (10) Practice in conducting community surveys.

To illustrate the nature of special instructional material, attention is called to *Building Operation and Maintenance*, which is a series of illustrated instruction sheets that have been prepared to assist in training janitors and low-pressure engineers.⁵

Recognizing the importance of securing efficient service from

⁴ Report of the Seventeenth Annual Conference in Trade and Industrial Education, Southern Region, issued by the U. S. Office of Education, Washington, D. C. 1935.

⁵ Herbert M. Chellis, and Others. *Building Operation and Maintenance*. Los Angeles, Calif., The Frank Wiggins Trade School, 1932. Price 50 cents. (Mimeographed)

janitors and engineers, the Los Angeles School District, among numerous others, is providing special training for them.

The format followed for these instruction sheets includes five items: (1) name of operation unit, (2) tools and materials required, (3) operation steps, (4) job application, and (5) questions.

8. Training firemen. A trained conference leader can conduct a series of conferences by means of which both volunteer and paid firemen can learn much about their duties and responsibilities. Of course, such conferences should be supplemented by drills and "evolutions" as well as by experience on the job. The following table gives an idea of the nature of the topics that are handled to advantage through the conference procedure. This list of topics was developed by Mr. George Saunders, State Director of Vocational Education, Phoenix, Arizona, on the basis of a study made in 1934.

TABLE XIX

A LIST OF SUGGESTIVE TOPICS FOR CONFERENCES ON FIREMANSHIP^{*}

- | | |
|--|---|
| 1. Fire-Fighting Methods | 21. Foremanship |
| 2. Fire Prevention | 22. Mathematics |
| 3. Use of Equipment and Material | 23. Character Education |
| 4. Ladder Drills | 24. Evolution |
| 5. Hose Evolutions | 25. Connecting Lines |
| 6. Fire Hydraulics | 26. Sketching Lines |
| 7. Fire Chemistry | 27. National Board Standards |
| 8. Public Relations | 28. Fire-Extinguishing Agents |
| 9. Fire Prevention and Inspection | 29. Control of Electricity at Fires |
| 10. Care of Quarters, Hose Equipment,
and Apparatus | 30. Forcible Entry-Ventilation |
| 11. Drills | 31. Different Types of Fires |
| 12. Salvage and Arson Investigation | 32. Ventilation |
| 13. First Aid and Rescue | 33. Small Tools |
| 14. Salvage Operations and Drills | 34. Pumping |
| 15. Building with respect to the Fire
Chief's Job | 35. Conference Leading |
| 16. Developing Interest of Men | 36. Direct Instruction |
| 17. Knots | 37. Department and Contact with the
Public |
| 18. Relaying | 38. Care of Quarters and Grounds |
| 19. Instructor Training | 39. Legal Status of the Firemen |
| 20. Science | 40. Auxiliary Fire-Fighting Equipment |

^{*} See, also, Bulletin 155, *Fire Fighting: An analysis of the fireman's job with suggestions for the organization and operation of training*. United States Office of Education, Vocational Bulletin 155, address Superintendent of Documents, Government Printing Office, Washington, D. C., 1931. Price, 30 cents.

TABLE XIX (Continued)

- | | |
|--|---|
| 41. Maintenance and Operation of Apparatus | 48. Dust Explosions |
| 42. Exposure | 49. Spontaneous Combustion |
| 43. Fire Hydrants | 50. Arson Cases |
| 44. Receipt and Transmission of Alarms | 51. Operating a Fire Department |
| 45. Overhauling Structures and Content | 52. Flammable Liquids |
| 46. Fire Investigations | 53. How Heat Travels |
| 47. Reports | 54. Static Electricity and Fire in Gasoline and Oil Tanks |

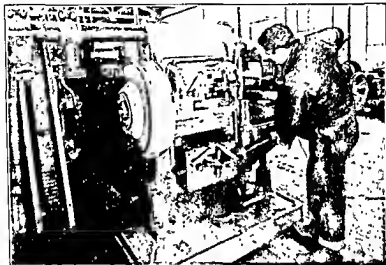


FIG. 47. An enrollee of the Civilian Conservation Corps who is learning to operate a universal miller in one of the school shops, Williamsport, Pennsylvania.

9. Learning through doing. Valuable as are carefully conducted demonstrations, well-selected illustrations, and appropriate explanations, mere telling and showing will not develop skill. There are certain subtle muscular coordinations and controls that must be acquired through doing. Adult education of the manipulative sort involves the same principles of teaching that govern the development of skills in younger persons.⁷ It is particularly important, however, that in adult vocational education the standard tools and materials of the trade be used.

Some justify using smaller, lighter, and cheaper tools than standard when teaching juniors, but not when teaching adults.

⁷ See alphabetical index for discussion of how skills are developed.

Sub-standard tools and materials should be avoided. Over-equipment is just as undesirable.

In teaching manipulative work, standards of quality should be kept in mind. It is desirable to have the quality as high as can reasonably be secured. Speed may be developed when the correct techniques have been learned. Speed is essential but grows out of correct concepts and habits, which first show in quality of work done. Quality is a relative term. The machinist is called upon to work to much closer limits than the cabinetmaker, and the cabinetmaker to closer limits than the carpenter.

10. How to select students. The effectiveness of adult education is influenced greatly by how well the students are selected. Some suggestions are made that may be helpful:

- (1) The prospective student should be interviewed by the instructor in person, or by someone else who is competent to judge the nature of the prospective student's previous experience and training.
- (2) Limit the class to persons whose qualifications meet those agreed upon. For trade extension classes this means that the instruction must be supplemental to the person's occupation.
- (3) In the case of special classes, such as apprentice classes, have each individual produce written evidence that he is actually apprenticed.
- (4) Make reasonably certain that the applicant is seriously interested in the work and that he understands the requirements and objectives of the instruction. Weed out the drifters who start night school merely because a friend is doing so.
- (5) Give a pre-test at the earliest opportunity to check on what the student knows or can do.
- (6) In organizing vocational classes seek the cooperation of foremen to the end that they encourage the more able young workers to supplement their trade experience through evening or part-time classes.

11. How to select subject matter. When adults come to evening school to learn about current social and economic conditions, they should not be asked to begin with the history of such conditions in ancient times. It is more to the point to start with the "New Deal." When they come for shop instruction the instructor's first responsibilities are such as these:

(1) *Use only functioning subject matter.* When an adult wants to learn blue-print reading and that is his chief aim, it would be unwise to attempt to give him the equivalent of the beginning course in mechanical drawing as usually taught to all-day pupils. He should be taught how to read blue-prints—not how to make drawings. He may not need to know how to make drawings—at least not at that time.

If he comes for a course in drawing for electricians, he should not be required to complete several sheets of lettering and unapplied geometrical drawing as a prerequisite. On the contrary, his lettering and geometrical drawing should be introduced as it is needed in giving him the practical, functioning kinds of drawing that he needs.

Similarly, if a carpenter comes to evening school to learn how to use the steel square for lay-out work, it would be a mistake to start him out with work involving other tools. He should be given what he has come to get.

(2) *Select subject matter that is in current use.* All subject matter must be evaluated in terms of its actual worth in meeting today's requirements. A distinction must be made between that which was useful and that which is vital. In order to know the dead material from the live the instructor must keep abreast of the latest developments in his field of major interest. Maintaining trade contacts and reading current trade and professional literature are effective ways of doing this.

It has been shown conclusively that American evening school students are not interested in traditional academic courses taught in the conventional way. Nor are they concerned about industrial arts and vocational courses that are unrelated to their personal requirements.

Among the topics of current interest to adults wanting vocational education are apprentice education, training for supervision and leadership, diesel engines, air conditioning, refrigeration, radio maintenance and repair, air-plane mechanics, flying, photography, automobile mechanics, electric and gas welding, and "trouble shooting" of many sorts.

Activities of a non-vocational sort that are of current interest

include dances, drama clubs, excursions, fraternal meetings, minstrels, orchestras, radios, parent-teachers meetings, and stamp clubs. Activities more closely connected with industrial arts include home workshop, home mechanics (taught in schools), furniture finishing and refinishing, furniture making, toy making, art metal crafts, air-plane model making, boat model making, kite making, birdhouse construction, learning to drive automobiles and to understand the basic principles of gas engine operation, making electric toys and appliances, and making and using bows and arrows.

(3) *Select subject matter through job analysis.* By job analysis is meant the procedure of listing out or determining what a learner must know, or be able to do, in order that he may effectively do any given job.

A common form for job analysis for trade education follows:

ANALYSIS OF JOBS IN MACHINE SHOP PRACTICE

What he should be able to do	What he should know	Sources of information	Methods of instruction
------------------------------	---------------------	------------------------	------------------------

Vocational teachers will find suggestions of value in such publications of the Vocational Division of the United States Office of Education as:^{*}

Bulletin 69, An Analysis of the Railway Boilermaker's Trade.

Bulletin 95, An Analysis of the Trade of Bricklaying, 20 cents.

Bulletin 102, Paper Hanging, an Analysis of the Paper Hanger's Trade, 10 cents.

Bulletin 106, Stone Setting, the Setting of Cut-Stone Trim in Brick Buildings, Specimen Instruction Material, 30 cents.

Bulletin 155, Fire Fighting, an Analysis of the Fireman's Job with Suggestions as to the Organization and Operation of Training, 30 cents.

Bulletin 168, Vocational Training for the Pulp and Paper Industry, a Job Analysis with Suggestions on the Organization and Operation of Training Programs, 20 cents.

^{*}These bulletins may be secured by addressing the Superintendent of Documents, United States Government Printing Office, Washington, D. C.

Merritt W. Haynes has described a plan of job analysis which consists in arranging type instruction jobs in the order of learning difficulties involved. Each type job is next broken down into three main classifications, each of which has sub-points. These groupings are:

- (1) *Production factors*, which include operations, tools, materials, and equipment.
- (2) *Auxiliary factors*, which include recognition and knowledge of stock, safety precautions, trade and technical terms, and care of equipment.
- (3) *Related technical factors*, which include trade drawing, trade mathematics, and trade science.⁹

Another way of getting at the problem of job analysis is to follow the suggestions set forth in detail by Robert W. Selvidge in *Individual Instruction Sheets*.¹⁰ References have been made to the technique of developing several types of instruction sheets in Chapter XIV of this book. It should be kept in mind that a job analysis in itself is not instructional material. It is merely a guide in developing functioning subject matter. Instruction sheets, based on job analysis, represent instructional material that can be put directly into the hands of learners.

Vocational Education Bulletin 106, *Stone Setting*, by George A. McGarvey, gives excellent instructional material for stone setters, building contractors, and students of architecture.¹¹ The bulletin was prepared for trowel-trades apprentices and journeyman workers. No attempt is made to describe in detail how to do the various jobs, but an outlined list of operations and the necessary technical information required is given for each job.

Teachers of industrial arts will find suggestions in *Standards of Attainment in Industrial Arts Teaching*.¹² The form of analysis followed in this bulletin is:

* Merritt W. Haynes, *Teaching Shop Work*, Unit Three, "Trade Analysis." Boston, Ginn and Co., 1921.

⁹ Published by the Manual Arts Press, Peoria, Ill.

¹⁰ A 225-page bulletin, well illustrated, issued by the United States Office of Education, Vocational Division, sold by the Superintendent of Documents, Government Printing Office, Washington, D. C. (Revised, 1935.) Price 20 cents.

¹¹ Address L. H. Dennis, Secretary, American Vocational Association, 1010 Vermont Avenue, Washington, D. C. Price 25 cents.

- (1) The things you should be able to do.
- (2) The things you should know.
- (3) What you should be.

12. **Class management.** There are a number of rather obvious differences between young people and adults. These differences call for modified instructional procedures and for different ways of handling classes.

Adults usually have rather clear ideas about what they hope to get through schoolwork. They are less docile and more aggressive, less submissive and more self-reliant than adolescents. The mature learner is inclined to do his own thinking—he is not ready to let others do it for him.

The instructor cannot *impose* his views on adults. Mature learners are not easily deceived about the value of what they get in class. If the teacher does not “ring the bell” or “hit the bull’s eye,” the adult students will walk out or fail to return. Above everything, adults resent being treated like children. In fact, many never venture to attend evening classes because they imagine, wrongly of course, that adult education is just like the formal, restrictive, narrowly conceived schooling of their childhood days.

Adults do not need, and naturally resent, efforts to use the traditional forms of school discipline. Such measures are decidedly out of place and uncalled for. Mature learners have respect for competent teachers, for public and private property rights, and for proper authority. So evening school and part-time teaching with adults is a man-to-man proposition in which the learner is anxious to demonstrate that he is a man who can be relied upon.

Such administrative details as asking for excuses for absence and asking permission to leave the room or shop are best forgotten. It is not the job of the shop teacher to embarrass the adult in any way, as for example by tactlessly correcting his spoken or written English. He will appreciate such help, however, if given in the proper way.

To say that the conventional methods of day-school management are poorly suited to adult teaching does not mean that basic principles of teaching are to be thrown to the winds. It

means that principles, methods, and techniques are to be *adapted* to the maturity of the learner.

Adults are more fixed in their habits than young people. If an adult wants to chew gum in the school shop, let him chew it. It will hurt no one. He is old enough to determine for himself whether or not he should do so. If it is not done by those whom he respects and looks to for guidance, he is likely to desist of his own accord. This method of handling what is commonly held to be an infringement of day-school regulations is probably slower but better than to say "you must not chew gum in school."

The adult is not impressed by meaningless or vague words—he has no use for verbalism. He wants his assignments and instruction in language that he can understand.

13. Emergency education. A large group of adults are getting training under the program of the Works Progress Administration. A study was made by Arthur Armstrong of the Minneapolis Department of Adult Education of 7000 students attending classes under the W.P.A. in St. Paul, Minnesota, in 1936.¹⁸

About one-third of the group was between the ages of 16 and 25. There were three times as many between 16 and 20 as there were over 51.

Of the total number 2089 were men and 5546 were women. This grouping is typical of volunteer educational programs for adults.

Marriage appeared to have little influence on attendance, for the married attended in numbers almost equal to the unmarried.

It was found that 80 per cent had been graduated from grade schools, more than 40 per cent from high schools, more than 10 per cent from vocational schools, and more than 12 per cent had some college education.

In the main, the Emergency Education Program calls for short units of highly specialized instruction to bridge the gap between unemployment and employment. There is also a distinct need for developing better social understanding and for building a better background for economic insights.

The functions of emergency adult education generally ac-

¹⁸ Arthur Armstrong, "Preparing for Life at Forty," *School and Society*, Vol. 46, August 21, 1937.

cepted, as given by Maurice M. Smith, Assistant Director of the Emergency Education Program of Oakland, California, are as follows:¹⁴

1. To help make up defects in early education.
2. To help develop late maturing interests and capacities.
3. To help understand and adjust and re-adjust to the ever changing environment in which we must live.
4. To develop mental attitudes and techniques of thinking and study.
5. To develop broader appreciations and tastes so as to refine and multiply our sources of pleasure.

There is wide variation in the concept of what should be included in emergency education. In some quarters narrow interpretations are made; in others the interpretations are broad. In the beginning errors were made through shortage of experienced leaders. Later the instruction was more clearly conceived; it was given with the aid of better trained teachers and it was supervised by persons who understood the valid goals and objectives.

14. **The Civilian Conservation Corps.** In March, 1933, the Congress of the United States authorized the organization of the program of the Civilian Conservation Corps. Within two years American youth was represented by something more than 290,000 young men. War veterans, kept in separate camps, numbered about 33,000, and 35,000 local, experienced men helped to operate the camps, of which there were about 1200.¹⁵

Each year the program of the "work camps" becomes more educational. These camps in America, as well as abroad, are proving of distinct value in developing pride in honest work, ability to work cooperatively, and in giving a better understanding of people from many places with many different backgrounds of experience and education.

Camp advisers give guidance and counsel. Personal interviews are one of many forms of guidance that are used. Movies, discussion groups, and learning through doing are supplemented by individual reading and study. Much is learned about nature and

¹⁴ Maurice M. Smith, *California Journal of Secondary Education*, pp. 37-42, March, 1930.

¹⁵ Frank Ernest Hall, "The Schools in the Camps," pp. 1-7.

about practical work through actual participation. Arts and crafts directors help to supervise such activities. Educational directors are used. It is their job to develop courses of instruction that are adapted to the needs of the men and to the facilities that can be provided. An increasing number of educational directors have had experience in practical arts and vocational education.

15. C.C.C. instruction manuals. Under the auspices of the Vocational Division of The Office of Education a series of excellent monographs has been prepared that is especially suited to instruction in the work camps. But they are equally valuable to teachers of industrial arts and vocational education. Each monograph gives unit lessons, references, and a bibliography. They were prepared by committees of competent persons whose experience fitted them for this service. All these bulletins are available at 10 cents each, except No. 14, which costs 20 cents.¹⁰ The following table gives a list of the available bulletins.

TABLE XX
THE CIVILIAN CONSERVATION CORPS VOCATIONAL SERIES

Num- ber	Title	Num- ber	Title
1	Agriculture	9.	Housewiring
2.	Automobile repairing	10.	Elementary masonry and bricklaying
3.	Automotive electricity	11	Mechanical drawing
4.	Carpentry	12.	Photography
5.	Concrete construction	13.	Radio servicing
6.	Cooking	14.	Soil conservation
7	Conservation of natural resources	15.	Plane surveying
8.	Forestry		

For adult education, instructional material must be up-to-date, within the price range of the average worker, concise, and practical. These bulletins meet these requirements.

¹⁰ Procurable from the United States Government Printing Office, Washington, D. C.

16. Problems and interests of adults. In order to get more factual data on the life problems and interests of adults, Percival M. Symonds studied 73 men and 111 women, all graduate students. He found that by far the most pressing problems of this group centered around money. They were also deeply concerned with a philosophy of life. Mental and physical health likewise



FIG. 48. An adult retraining project—teaching an unemployed man electric welding in one of the Williamsport, Pennsylvania, Vocational School shops.

meant much to them. Social problems were secondary to personal problems.

This group is different in many respects from other adult groups. In fact there is much variation from place to place and within local areas.

17. Evidences of successful teaching. By what kind of yard stick may a teacher measure his own professional success? Many self-rating charts and scales have been devised. The following table shows some of the items that may well be considered in

judging shop instruction on either an industrial arts or a trade basis.

The validity of the items have not been determined scientifically. It is believed that most of the items are valid for all-day, part-time, and evening classes.

TABLE XXI

SOME EVIDENCES OF SUCCESSFUL TEACHING

1. Abundant student activity with a minimum of evident control on the teacher's part.
2. An atmosphere of freedom, cooperation, and obvious interest in the work being done.
3. Everything in its place and a place for everything.
4. Student participation in shop or class management.
5. Objective testing and measuring of progress and achievement.
6. Adequate but not cumbersome records.
7. Abundant illustrative material, such as charts, models, samples, and specimens.
8. Suitable reference material, such as instruction sheets, drawings, periodicals, books.
9. A well-kept bulletin board.
10. Attractive displays.
11. A high per cent attendance.
12. Equipment in first-class condition.
13. Students eager to come and remain as long as possible.
14. A radiant, enthusiastic teacher.
15. Evident cooperation between teacher and industry.
16. Friendly relations between teacher and other instructors and school authorities.

18. Factors in adult learning. It is essential to recognize that there are points of likeness as well as of divergence between teaching pupils in secondary full-time schools, on the one hand, and adults on the other. Among the factors in adult learning that deserve special mention are the following: (1) attitudes of mind; (2) habits that influence learning; (3) fears or mental complexes; (4) cares and worries common to adulthood; (5) fatigue; (6) available time; (7) desire to learn; and (8) capacity to profit by instruction.

(1) *Attitudes of mind.* It is a matter of common knowledge that one can learn very little without there being present, consciously or unconsciously, a desire to learn. Children exemplify this kind of mental attitude, sometimes spoken of as a "problem-solving" attitude, in a marked and highly commendable way. This is frequently, though not always, true of adults—especially

not in areas of learning outside those in which they have had recent experiences. In some instances they have often been informed, though wrongly, that grown people cannot learn as readily as young folk. In other cases they have erroneously come to this conclusion themselves, not realizing that it may have been fatigue or worry or other interests that served as elements of distraction rather than that there actually was reduced ability to learn. It is therefore most encouraging to find that research in adult learning has demonstrated that adults can learn readily if they wish to do so, and if conditions make it possible for them to devote themselves to it.¹⁷

It appears that children can learn to memorize simple facts more quickly than older persons, but that adults have the advantage in forms of learning where judgment and analytical thinking are involved.

It is consequently not true that able-bodied men and women are too old to learn—provided always that they have the will that is needed to make the effort.

In teaching adults one must expect to find attitudes more firmly entrenched than is true with children, and it will consequently depend greatly upon the learner what progress he will make in what is taught.

(2) *Habits.* Children, because they spend most of their time in learning—both in and out of school—and because they have few conflicting responsibilities, soon establish fairly satisfactory study habits. On the other hand, adults develop many socially, economically, and politically desirable habits that are not exactly study habits.

It is well known that habits, once strongly established, are hard to break. For example, if we are in the habit of drinking coffee for breakfast we dislike to go without it, or, if we are in the habit of spending much of our leisure in light reading, going to the movies, playing cards, or playing something else, we find it hard to break those old habits in order to re-establish study habits possessed in earlier years.

It is clear, then, that it requires not only a proper mental at-

¹⁷See E. L. Thorndike, and Others, *Adult Learning*, New York, The Macmillan Co., 1923, pp. 177-8.

titude for an adult to learn efficiently, but it also requires will-power to re-establish study habits. This is not easy. At times it is so difficult that the wise teacher will want to give thought to encouraging the learners, through suitable words of commendation or otherwise, in order that they may not become discouraged. Thomas A. Edison is reputed to have said that 98 per cent of his success was due to perspiration and 2 per cent to inspiration. Few have the perseverance of an Edison. The instructor's job is in part one of helping to develop study habits in learners against the handicaps of other conflicting habits that adults possess.

(3) *Fears or mental complexes.* Persons who have been out of school for years, and whose experiences have been primarily in business, commerce, agriculture, or industry, and rather away from formal instruction, are likely to be timid toward any undertaking that smacks of "going to school." Foremen in industry, adults in concentration camps, fire officers in paid as well as in volunteer fire companies, those getting re-habilitation training, unemployed adults being retrained, and others may have certain mental reservations against "going to school."

For our purpose it is not necessary to determine why such fears or reservations may be in the minds of adults. It makes little difference whether it is fear of not knowing what an instructor may expect, fear of tackling something quite new to them, or whether it is fear of giving evidence of inadequate training or experience. The important factor, it would seem, is to recognize at the outset that an instructor meeting a group of adults for the first time should not expect that whole-hearted confidence that is typical of the relationship between children and parents or children in the full-time school and their teachers.

Whatever an instructor can do to allay or to minimize such false, though very real, fears or mental states should naturally be done. A few frank words of explanation coupled with tactful procedure on the part of the instructor will prove helpful.

One should not blame adults for being a bit timid about entering whole-heartedly into such training plans as may be proposed. They have learned through hard experience that "all that glitters is not gold" and so it is perfectly logical that they

should be reserved and even skeptical until the instructor can prove to them that he can be of real help. It is understood, of course, that what has here been said applies to situations where the instructor and the learners have not previously known each other.

(4) *Cares and worries.* Adults frequently find it more difficult to concentrate than children do, because mature persons usually have much that concerns them deeply. It may be thoughts of the source of tomorrow's food supply; it may be love for members of the family or relatives or friends who are ill or in need; it may be reflections about a hundred or more things, events, or experiences that form the essential warp and woof of the lives of grown persons.

Because adults have themselves experienced much, they feel more deeply, sympathize more, and are more concerned with hazards, sorrow, and misfortune that affect others than children are. It is consequently difficult for an adult to free himself from distracting thoughts and emotions. In recognition of this, instructors of adults will do well to so present subject matter that it will arouse interests sufficiently strong to keep at a minimum such mental or emotional distractions.

It is quite possible that the pursuit of systematic learning, even though undertaken with considerable apprehension on the part of the learner, may provide exactly what he most needs, namely, a constructive, worth-while activity that will help him to forget things that are disturbing and enervating.

(5) *Fatigue.* While age, as such, is not a bar to learning, the fact must not be overlooked that with increasing years individuals may not have that reserve of physical and nervous energy enjoyed by youth. Many times adults seek instruction after they have done a full day's work or when they are more or less fatigued.

If the instruction calls for a considerable amount of concentrated attention or of other forms of mental or physical activity, it stands to reason that the effects of fatigue, such as reduced speed of learning, will become evident to the instructor. What may at first glance look like lack of capacity to learn readily, may actually be evidence of fatigue. Some adults make great

sacrifices to get the instruction that they want. In some cases they overwork in order to get such training; in other instances they refuse to admit that they are too ill or too weak to pursue instruction; in still other cases they forego both luxuries and necessities of life in order that they may get the instruction which they covet.

Fatigue, then, may be an important fact that must be recognized and that has to be dealt with understandingly by the instructor.

(6) *Available time.* In planning instruction for those who have already undertaken the serious work of society, the element of available time is important. Let us take, for example, the case of the unemployed adult who is to be re-trained for vocational competence in line with changing conditions. Theoretically one might argue that, since he is not employed, he surely has time enough to get the training required; but, after all, time is valuable and the man without work must get to where he can again command a fair wage in the minimum length of time.

In some instances it is necessary for some agency to step in and provide maintenance for him and for his family until the man is again able to earn a living. This forcibly thrusts upon those charged with adult education the need for careful, critical evaluation of what is taught toward the end that time be conserved for the learner. At best the time involved is longer than most bread winners can well afford. In recognizing this practical fact it is not to be forgotten that whatever training is given should measure up to proper standards of quality. Little is gained through superficiality, and much may be lost through it.

By planning instruction in short units, each forming an integral part of the larger whole, the learner gets a quick return for his effort and feels that he is making definite progress toward his major objective.

(7) *Desire to learn.* In their book, *Adult Learning*, to which reference has already been made, Thorndike and his associates point out that there is danger in placing too much credence in the frequently heard belief that adults are easier to teach than young people are because mature individuals are more interested

in learning than are young folk.¹⁸ Thorndike calls attention to the fact that adults, like younger people, sometimes study for ulterior motives rather than because they are greatly interested in what is taught. In other words, with adults as well as with young people, learning is sometimes pursued for the sake of expediency rather than from a genuine desire for the instruction. On the other hand, those who have the opportunity to compare the results obtained from adult classes of the professional or the occupational improvement types with classes composed of students not yet following the profession or occupation concerned feel that, in many instances at least, the better work is done by the adults on the job. This superiority of work—if it is superior—may frequently be traced to the advantages that come through experience.

It is probable that students in secondary schools and in college put forth as much effort to learn as do adults, and that they are as interested in their work as are grown folk—though perhaps for different reasons. Exceptions to these general statements are to be expected.

Interest is very important to efficient learning. It is fortunate that interests can be developed. In fact, education may be thought of as the effort to guide and prepare individuals for greater usefulness through broadening and deepening their interests along socially desirable lines.

(8) *Capacity to learn.* Adults differ more in their capacity to learn than do high school pupils. Adult education, by drawing upon hitherto undeveloped capacities, aims to develop hidden sources of power so that when, in a rapidly changing social order, a person finds himself unemployed, these previously undiscovered capacities can be utilized in bringing to him renewed success.

Achievement in the realms of learning facts, or of acquiring new skills, or in developing new or deeper appreciations and understandings is the composite of native capacity, of interest, effort, energy, and perseverance. Inherited capacity, important as it is, is only a starting point. There is no substitute for hard work, for sustained effort, for "ability to take it," for vision, decision, and courage.

¹⁸ *Ibid.*, p. 179.

Thorndike and his associates in their book *Adult Learning* claim that it is reasonably certain that the general fact that "inner growth" may increase ability to learn favors adults as compared with children.

They assert that, other things being equal, inner growth gives to individuals from twenty-five to forty-five years of age as much ability to learn as they had between twenty and twenty-five years of age. They furthermore assert that their ability between twenty-five and forty-five is greater than their ability between fifteen and twenty years, and, finally, that at twenty-five to forty-five the ability to learn is much better than it was when they were five to fifteen years of age.

19. **Supplementing casual learning.** One of the purposes of adult education is to supplement casual learning or "pick-up" learning which, while valuable, is woefully inefficient. Arthur E. Morgan has pointed out that even a mother cat will not leave her offspring to learn to hunt their food or to learn to fight by mere chance, but that she painstakingly teaches her kittens to do these things in the right way.¹⁹

Learning through life experiences is very valuable and it should receive due recognition for all that it contributes to progress, but surely such training is at its best when it goes hand-in-hand with systematic, direct, and carefully planned instruction that clearly seeks to supplement, to enrich, to strengthen, and to correct the casual learning of life experiences.

Under the relatively simple life of pioneer days—simple in many respects, yet fraught with hardships and dangers—it was scarcely necessary to resort to systematic group instruction. But under the more complex, highly developed scientific, industrial, economic order of today neither general education nor vocational education can safely be left to indirect, casual, or pick-up methods.

PRACTICAL SUGGESTIONS FOR TEACHING

Certain practical suggestions can be made on the basis of the discussion in this chapter.

¹⁹ Arthur E. Morgan, "Learning Through Experience," *National Society for the Study of Education, Yearbook XXI, Part II*, pp. 186-8.

1. Evening school students must be handled as adults, not as adolescents.

2. It has been proved that the older persons who attend part-time and evening schools are not too old to learn.

3. The responsible positions in industry and in the professions are held by grey-haired people.

4. Experience is a priceless asset. Systematic adult education, such as offered through evening classes, is to supplement it and make it more effective.

5. The chief purpose of adult education is to further continuous growth—intellectually, emotionally, vocationally, culturally, and spiritually.

6. Some of the advantages usually associated with youth, namely, enthusiasm, cheerfulness, adaptability, and greater care in personal appearance, are not beyond the reach of adults. In fact, adult education should be a means of strengthening these traits.

7. Vocational adult education must seek its inspiration, standards, and goals from the best current industrial practice.

8. Many adults employed in highly repetitive work, or in jobs that they have long ago mastered, are in need of general education of some form—such as avocational education.

FOR DISCUSSION

1. Compare the representative evening school student with the all-day school pupil.

2. Compare the problems of school shop management as encountered with evening school students to those of the all-day school.

3. Present the arguments for and against having the day school shop teacher teach evening classes also.

4. If machine operators are permitted to receive instruction on machines with which they are not familiar, why prevent laborers and clerks from doing the same thing in evening school?

5. What effect does maturity have upon the ability to learn?

6. Come prepared to give a short talk to a group of men in industry on the advantages of attending evening school.

7. What are the requirements for conducting a successful training conference for leaders in industry?

8. Compare round-table or conference procedure with panel technique.

9. State and evaluate the advantages and limitations of short-unit courses for adults.

10. What kinds of visual-sensory aids are adapted to evening classes in your area of special interest?
11. Describe the present public attitude toward adult education in your community.
12. Name a number of industries that conduct training classes for adults.
13. Describe the adult training program in a city or larger area of administration with which you are familiar.
14. Make several constructive suggestions as to how to select functioning subject matter for adult education.
15. Give your interpretation of what constitutes poor as well as good class management.
16. Interview one or more young men who have attended C.C.C. camps and report upon the nature and extent of what they learned in camp.
17. Interview one or more teachers of emergency education classes and report upon the specific problems that are met by such teachers.
18. Review Thorndike's book *Adult Learning* and report upon his findings and conclusions.
19. Make an oral report on Chapter XIII, "Methods" of Friese's *The Cosmopolitan Evening School*.
20. Review, and report upon, Chapter XVI, "Efficient Instruction," in *Adult Education: The Evening Industrial School*, by Prosser and Bass.
21. Study and report upon Chapter XII, "Teaching Adults in Evening Schools and in Other Classes," in *Methods and Teaching Problems in Industrial Education*, by Struck.
22. Study and report upon an article of your own selection from Ely's *Adult Education in Action*.

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FIG. 42. A class in cake decoration at the Frank Wiggins Trade School, Los Angeles, California.

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CHAPTER XXI

APPRENTICESHIP AND PLANT TRAINING

PURPOSES AND PROCEDURES

1. **Meaning of apprenticeship.** Industry has long distinguished between learning a job through apprenticeship and by the "pick-up" method, such as is commonly used by helpers, who sometimes eventually gain sufficient knowledge and skill to work as skilled craftsmen.

By apprenticeship is commonly meant an understanding, written or implied, between an employer and an employee, whereby the latter is to receive instruction in a specified trade, craft, or business.

The apprentice's compensation is in two forms: (1) *instruction* and (2) *wages*. The arrangement is one that enables the learner to earn while he learns. This learning period in apprenticeship is for an extended period of time—not as long as in Colonial times, but still long enough to differentiate it from short, intensive training.

The Federal Committee on Apprenticeship defines an apprentice as follows: "An apprentice is a person of at least 16 years of age who has entered upon a written agreement with an employer or an association of employers which provides at least 2000 hours of reasonably continuous employment for such person and his participation in an approved training program."¹ In many skilled trades the period of apprenticeship is four years.

2. **Plant training.** Apprenticeship training may or may not be given in entirety by an industry, corporation, or plant. When an employer or a corporation gives training in its own establishment it is *plant* training as distinguished from school training.

Plant training, in the broader sense, ranges from long-time

¹ *Apprentice Training*, Bulletin 2, issued by the Federal Committee on Apprenticeship Training, Washington, D. C., December, 1935.

apprenticeship and long-time training for foremen and executives to short intensive training. One form of plant training is *special training*. This is instruction that is given for a specific operation or for highly specialized work.

When the instruction prepares the worker for a higher or more responsible job it is called *up-grading* training, and, when such instruction is given in a production, maintenance, or service department rather than in a separate training department, such training is called *floor training*.

In the more restricted sense, "*plant training*" is defined as training for skilled or semi-skilled jobs requiring short training periods. Examples of such jobs are power-machine operating, assembling the parts of a radio, and operating a loom. "Occasionally," says Robert H. Spahr, "there is a feeling that 'shop training' or 'job training' displaces all forms of apprenticeship. But an analysis of the situation leads one to conclude that each has its place and serves a distinct purpose and produces a desired result."²

The so-called "plant," "shop," or "vestibule" training is to give proficiency in a specific job, whereas apprentice education is broader in scope.

Special standards and conditions under which a public school system may or may not be justified in establishing training programs in private industrial plants are set forth in *Statement of Policies for the Administration of Vocational Education*, Bulletin 1, Revised, February, 1937, United States Department of the Interior, Office of Education, pages 55 to 58 inclusive.

3. Apprenticeship old and new. Apprenticeship dates back to antiquity. During the Dark Ages that followed the fall of Rome, apprenticeship was the chief source of education for the masses. During the period of the Renaissance the craft guilds did much to raise the standards of workmanship. The old apprenticeship may be compared with the new in such ways as these: The old apprenticeship involved a father-to-son relationship, the new does not. The old form involved a written indenture or contract; modern apprenticeship may or may not call for it. In the old

² *Apprentice Training*, p. 6, Chamber of Commerce of the United States, Washington, D. C.

days apprenticeship was a matter of choice and desire. Formerly the master gave all the instruction on the job; nowadays it is common to give a part of it on the job and the remainder in special instruction in school.

Other differences are the rate at which changes take place in trade practice, and the length of the working day. The period of apprenticeship has likewise been shortened from seven or more years to one to four or five.

The old-time apprentice received little beyond his clothing, lodging, and meals, whereas the modern apprentice receives a reasonably substantial wage in addition to instruction, which is often more extensive than it used to be.

The entrance requirements for modern apprentices are far higher than they were in the days of Queen Elizabeth. Today employers want a boy to have completed the grade school and often the high school, and preference is given to those who have had definite pre-employment training for the trade or occupation in which they seek employment.

4. Standards for judging apprenticeship. Modern apprenticeship must be judged on the basis of its goals. The *chief* purpose of apprenticeship is *to further the efficiency of the worker*. It does not pretend to teach what is unrelated to his work. The chief emphasis is upon greater skill and more thorough understanding of the related trade theory. This does not mean that better preparation in social and economic theory is unimportant, or that art, literature, music, and the drama are of little consequence. It merely means that in the United States most employers feel that their efforts in apprenticeship education should be definitely directed to making the worker a better worker. The other aspects of education are left to other agencies.

Of course occupational efficiency depends upon more than skill and knowledge. Attitude, cooperation, and team work are also vital to occupational success. These matters are not overlooked. They are definitely integrated with skill and knowledge. Every industry worthy of the name promotes individual pride in work well done, fosters good will, and promotes plant pride. Men are taught that their particular task, limited though it may be, is

essential to the success of whatever is undertaken by the plant or industry as a whole.

5. Training on the job. The slogan of the up-to-date vocational school is "learn through doing"; that of modern industry is "training on the job." Both these slogans stress things that are worth emphasis. But learning must not be limited to such means. A century or more ago an apprentice could learn all that he needed to know "on the job," but the body of related mathematics, science, drawing, and trade theory has grown so extensive for many trades and occupations that industry believes in supplementing training on the job with correlated instruction given in the school laboratory and classroom.

Even the "practical work" is often supplemented by manipulative instruction given on a pre-employment basis as well as on a trade extension basis. One reason for this is that modern industry is organized primarily for production—not for instruction. Employers prefer to give no more time to instruction on the job than is necessary. It takes the time of competent foremen who might be doing other things and it slows up production.

Modern apprenticeship calls for cooperation on the part of several training agencies. Some of the training is given on the job. This may be supplemented by home-study, by part-time classes, evening classes, and correspondence instruction.

The attitude of labor toward "training on the job" in the building trades is reflected in the following paragraph:³

While it is generally admitted that an apprentice is at best a financial liability for the first year, and often longer than that, it is not that phase of the problem which is objected to so much as it is the added difficulties on the job when an apprentice is taken on. The expression most frequently used by contractors is that they "can't be bothered with boys." Rapid building makes training on the job not only unprofitable but well-nigh impossible. Employers and journeymen agree that it is simply not possible to carry out any real program of teaching on the job. To this school authorities and lay opinion, equally interested but not so directly involved, add that whether possible or not, there certainly is no training on the job. The boy merely "rubs off" what he can while he is working with journeymen, and where school work is part of his training the school is expected to supply, in a few hours a week, the technical and mechanical knowledge which the job can not, or at any rate does

³ *Apprenticeship in Building Construction*, Bulletin 459, United States Department of Labor, Bureau of Labor Statistics.

not, provide. One authority made the unequivocal declaration that "there simply is no such thing as training apprentices on the building."

The direct instruction that is given on the job is usually given by foremen and skilled workers. The modern foreman has a three-fold responsibility: (1) to get out production, (2) to keep down costs, and (3) instruction. He is probably least well trained for the responsibility of instruction. Foreman-training conferences are designed to teach him how he can become a better foreman in all three respects. Apprentice training, then, hinges upon foreman training, which is furthered by industry and by federal and state plans of vocational education.

6. **The Federal Apprenticeship Commission.** In June, 1935, the President of the United States issued an executive order establishing the National Youth Administration. Two months later the N.Y.A. designated the *Federal Committee on Apprenticeship Training* and its affiliated state committees as the agency for carrying on this training under the N.Y.A.

William F. Patterson was selected as Executive Secretary. The Federal Committee members include representatives of the United States Department of Labor, the United States Office of Education, the American Federation of Labor, the N.Y.A., and employers.

The functions of the committee include: (1) to guide and advise agencies interested in apprenticeship, (2) to safeguard the interests of apprenticeship in federal and state legislation, (3) to help to promote apprenticeship, and (4) to provide for field service in the states.⁴

The Committee believes that a written apprentice agreement is vital to apprenticeship. They likewise go on record as favoring adequate state supervision of apprenticeship as necessary to a modern program. School instruction of not less than 144 hours per year is advocated. The Committee particularly favors apprenticeship instruction that is carried out under the United States Office of Education, the State Boards for Vocational Education, and local boards of vocational education in cooperation with industry.⁵

⁴ See *Apprenticeship Training*, Bulletin 2, issued by the Federal Committee on Apprentice Training, Washington, D. C., 1935.

⁵ *Ibid.* p. 8.

In 1935 forty-three state committees were organized. The personnel of these committees included representatives of the State Department of Labor, the State Board for Vocational Education, the United States Employment Service, the National Youth Administration, and representatives of employers and employees of the states. Their functions are to carry out within the states the objectives that have been set for the country as a whole by the federal committee.

Trade advisory committees are appointed in the states to advise the state committees on apprenticeship, which in turn pass on their recommendations to the federal committee.

A clarification of apprenticeship responsibilities. A Joint Memorandum on Apprenticeship* was issued by Miss Frances Perkins, Secretary of the United States Department of Labor, and Dr. J. C. Wright, Assistant Commissioner for Vocational Education, United States Office of Education, which clarifies the functions that each of these services should render with respect to apprenticeship. The following paragraphs are quoted from this memorandum, which was addressed to the Sub-Committee on Appropriations for the U. S. Department of Labor, House of Representatives:

There seems to be some question in the minds of the Committee members as to which phases of apprentice training relate to labor standards and which relate to education. It is clearly and officially recognized by the President, the Office of Education, the United States Department of Labor, the National Youth Administration, the American Federation of Labor, various national associations of employers, and State governments that there are two distinct groups of responsibilities and functions in the promotion and subsequent operation of plans for apprentice training. One group deals with the apprentice as an *employed worker*—the conditions under which he works, his hours of work, his rates of pay, the length of his learning period, and the ratio of apprentices to journeymen so that over-crowding or shortage of skilled workers in the trades may be avoided in large part. The second group of responsibilities deals with the apprentice as a *student*—the related technical and supplemental instruction needed to make him a proficient worker and the supervision and coordination of this instruction with his job experience.

The Office of Education and educators generally have not conceived it to be a part of their function in providing educational training for apprentices to give consideration to problems which relate to labor standards. Frank Cush-

*United States Office of Education, C. L. 2032, December 17, 1937.

man, Chief of the Trade and Industrial Education Service of the Office of Education, has stated, "We think there are two groups of responsibilities (in apprenticeship). One group has to do with labor standards, wages, hours, quotas, length of apprenticeship period, etc. The other group has to do with education and training of apprentices." Mr. Thomas Quigley, Professor of Industrial Education at the Georgia School of Technology, and Vice-President of the American Vocational Association, said recently, "Certainly the vocational schools and their staffs do not wish to entangle themselves in the wages, working hours, and labor disputes involved in apprenticeship agreements any more than they do in other issues extraneous to the schools' one great job of training and coordinating such training."

There also seems to be a question in the minds of the Committee members as to whether the two distinct phases of apprenticeship can be most effectively furthered nationally by a single administrative agency or by the two Government agencies which have jurisdiction, experience, and facilities in the respective fields. It has been amply demonstrated that the responsibilities in connection with the apprentice as an *employed worker* can best be carried on by the State labor department which is charged with the general responsibility of improving working conditions and fostering the well-being of the workers, and that the responsibilities in connection with the apprentice as a *student* can best be performed by the State board for vocational education. These State agencies in turn look to the United States Department of Labor and to the Office of Education for leadership and research and for the determination of national standards in their respective fields.

Except in a few States there has been no adequate machinery developed to promote uniformity and give adequate protection to employment standards of apprenticeship. Partly because of lack of interest in apprenticeship on the part of employers and partly because of this lack of machinery, this vital system of training for the highly skilled trades has not kept pace either with the needs of industry or with the opportunities for employment in the skilled trades. The United States Employment Service, as a consequence, warns that unless apprentices are put on now, within a very short period of time, there will be a real shortage of skilled workers in many of our most important industries. Labor has repeatedly expressed itself in opposition to any apprenticeship program that does not provide proper safeguards for labor standards. If young workers are to be apprenticed to prevent this impending shortage, the trade unions must be assured that the boys' interests will be safeguarded, that labor standards will be upheld, and that the apprentice will not be put on at the expense of the older worker. The agencies that can gain the cooperation of the trade union movement with employers in the development of the labor standard phases of apprenticeship are the labor departments—Federal and State.

With funds for apprenticeship promotion on a national basis, the United States Department of Labor will be carrying out the purpose for which it was created, "to foster, promote, and develop the welfare of the wage earners of

the United States, to improve their working conditions, and to advance their opportunities for profitable employment." It will in no way encroach upon the work now being done by the Office of Education, but on the contrary, as evidenced by the activities of the Federal Committee on Apprentice Training during the past two years, will vitalize and greatly increase the demands upon the school authorities for pre-apprentice training, related instruction for apprentices, coordination of this instruction with job experience, the preparation of trade analyses and outlines of instruction, and for specially trained teachers to carry on these functions.

7. Occupations adapted to apprenticeship. There are several hundred skilled occupations for which apprenticeship may be conducted to advantage. Only a few of these will be mentioned here:

TABLE XXII

SOME OF THE OCCUPATIONS FOR WHICH APPRENTICESHIP
MAY BE GIVEN

1. Automobile body builder	21. Glass-maker
2. Automobile electrician	22. Industrial chemist
3. Automobile mechanic	23. Drop-and-die forger
4. Aviation mechanic	24. Hammermith
5. Acoustician	25. Steel-worker
6. Air conditioner	26. Templet-maker
7. Bricklayer	27. Welder
8. Bridge carpenter	28. Engraver
9. Elevator repairman	29. Watch repairman
10. Granite cutter	30. Instrument-maker
11. Interior decorator	31. Tool-maker
12. Ornamental plasterer	32. Baker
13. Pipe-fitter	33. Chef
14. Plumber	34. Dental mechanic
15. Roofer	35. Leather-worker
16. Steam-fitter	36. Lens-grinder
17. Tile-setter	37. Motion-picture cameraman
18. Electrician	38. Musical-instrument maker
19. Meter-tester	39. Photo-engraver
20. Core-maker	40. Sign-painter

8. Requirements for apprentices. The requirements that are set up for apprentices differ in detail but not greatly in fundamentals. As a fair sample of reasonably high standards the following ones, taken from those established for apprentices in the Canal Zone, will be suggestive.*

* *Regulations for Employment of Apprentices in Skilled Crafts of the Canal Zone*, the Panama Canal Executive Office, 1936.

- (1) *Citizenship*: Eligibility for appointment is restricted to citizenship as required for Civil Service.
- (2) *Age*: Not less than 18 or more than 22 on the date of employment.
- (3) *Physical fitness*: Minimum, as specified in the "Gold Roll." Additional requirements as to weight, height, etc., for special occupations.
- (4) *Educational fitness*: Successful completion of an accredited four-year high school.
- (5) *Aptitude test*: The candidate must successfully pass any aptitude or other test prescribed by the Division of Personnel Administration.
- (6) *Previous craft experience*: Not required but credit for such experience may be given.

9. *Apprentice training in the Philadelphia Navy Yard.* Well-rounded apprenticeship in more than twenty trades is given in the United States Navy Yard, League Island, Philadelphia.⁸ The normal length of the training period is 4 years or 7648 hours of instruction in shop and school. Apprentices work for 40 hours per week, of which 6 are spent in the classroom. School hours are paid for as working hours. The compensation is by the day, as follows: first year, \$2.40; second year, \$3.20; third year, \$4.00; and fourth year, \$4.80.

Trade skill is taught on production jobs with modern equipment and in well-lighted, up-to-date shops. Special courses in related instruction are given. This work is closely coordinated with the practical work.

Examinations are closely supervised and certificates are issued at the regular annual commencement exercises.

10. *Apprentice training for plumbers.* Standards for a five-year apprenticeship for plumbers and steam-fitters were approved in 1936 by the master plumbers and the United Association of Journeymen Plumbers. These standards include such features as these:⁹

- (1) Five-year apprenticeship (recognized since 1883).
- (2) Written indenture.
- (3) Related school instruction of 720 hours required.

⁸For particulars see "Apprenticeship in the Philadelphia Navy Yard," by L. Q. Moss in *Marine Engineering and Shipping Age*, October, 1936.

⁹For a more complete statement see *Plumbing and Heating Trade Journal*, September, 1936. Or *Apprentice Training News*, Issue 17, November 20, 1936.

- (4) Advisory committees having equal representation of masters and journeymen.
- (5) Only indentured apprentices to help plumbers—helpers eliminated.

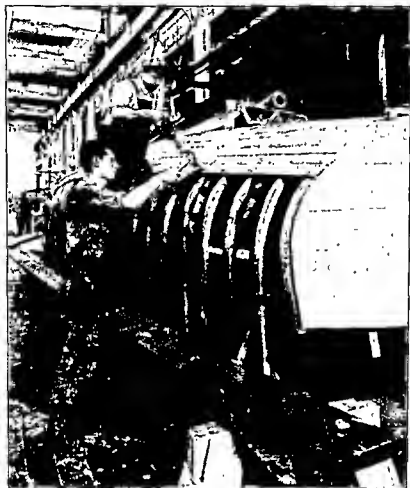


FIG. 50. Apprentice body builders planking motor boat at the United States Navy Yard, League Island, Philadelphia.

- (6) Classes under supervision of State Boards for Vocational Education.
- (7) Nation-wide uniform plan of apprentice training.

- (8) The first national plan in any building trade endorsed by the national labor and employer groups of the industry.
- (9) Involves cooperation between trade, state, and federal agencies interested in apprenticeship.¹⁰

11. **Apprentice training for electrical workers.** Allan White Forbes, *President of Forbes and Myers, Electrical Manufacturers*, is not satisfied with the regulations of Federal Committee on Apprenticeship. The statement as to the "time" is objected to by him as being too general. The regulations specify that "the training period shall be not less than 2000 hours nor more than 10,000 hours, and shall be reasonably continuous." He feels that the implication that graduation must follow a specified number of hours regardless of accomplishment is wrong. Mr. Forbes holds that not to permit shortening of the program for persons of superior accomplishment is "a serious defect."

He furthermore criticizes the provision, "Not less than 144 hours per year may be devoted to approved instruction in general and technical subjects, by and under the direction of public authorities." This, he thinks, "implies the right of the Federal Committee to force any boy into any vocational school which it elects."

Mr. Forbes says, "The several states have doubtless been faulty and backward in their regulation, or lack of regulation of the evils of child labor, and they certainly have been negligent in not encouraging and promoting sane programs of apprenticeship training. But, it should be pointed out, no state has ever to my knowledge manifested such disregard for the best interests of its young people as to designate its Secretary of Labor to be the arbiter of an educational program for its young people."

The plan of apprenticeship proposed by Mr. Forbes for his employees is more flexible than is permitted under the plan which is promoted through the Federal Committee on Apprentice Training.¹¹

¹⁰ See, also, "In 1911," by S. Lewis Land. *Official Bulletin*, Heating, Piping and Air Conditioning Contractors National Association, September, 1935.

¹¹ For details of the Forbes plan see: "An Apprentice Training Plan in the Electrical Industry," by Allan White Forbes, *Industrial Education Magazine*, 37: 182-92, September, 1935.

12. Apprenticeship in building trades. Among the best-organized programs of apprenticeship in the building trades may be mentioned those of: (1) The Tile and Mantel Contractors' Association, (2) the Associated Tile Manufacturers, for whom Dunwoody Institute, Minneapolis, serves as a training school, (3) the National Association of Marble Dealers, which operates a school at Knoxville, Tennessee, (4) the National Association of Master Plumbers, and (5) the Piping and Air Conditioning Contractors' National Association.

In other trades, such as bricklaying and plastering, there is considerable apprenticeship but no national cooperation between employers and employees. The International Brotherhood of Electrical Workers has no systematic apprenticeship program.

The seasonal nature of the work in such trades as plastering, carpentry, and painting and decorating make it more difficult to have systematic apprenticeship than in the metal industry, where employment may be more continuous and where employees shift less from job to job.

13. Some representative industries interested in Apprenticeship. The representative nature of industries interested in apprenticeship may be judged from the following table, which lists merely a few of such concerns. Most cities having a population of

TABLE XXIII

REPRESENTATIVE INDUSTRIES INTERESTED IN APPRENTICESHIP

American Institute of Banking
American Telephone and Telegraph Company
Atcheson, Topeka and Santa Fe Railroad Company
Browne and Sharpe Company
General Electric Company
Mergenthaler Linotype Company
Motor Companies: Buick, Chevrolet, Chrysler, Dodge, Ford, Packard, Plymouth, etc.
National Cash Register Company
Norton Company
R. Hoe and Company
R. R. Donnelley and Sons Company
Singer Sewing Machine Company
United Shoe Machinery Company
Warner and Swasey Company
Western Electric
Westinghouse Electric and Manufacturing Company

100,000 or 200,000 people could compile a longer list of local industries interested in apprenticeship.

14. **Trade advisory committees.** There are a number of matters that trade advisory committees, which deal with matters other than teaching, should consider. These include determination of wages, the number to be trained, and the conditions of meeting their requirements. Other such considerations deal with hours of work, the selection of the instructor, and promoting the best interests of apprenticeship in the community.

There are other recommendations, however, that the trade advisory committee can offer which relate rather closely to teaching. They may

- (1) make suggestions concerning the nature of the equipment to be used.
- (2) suggest text and reference material.
- (3) advise with regard to the content of the curriculum.
- (4) make recommendations on the content of courses of study.
- (5) assist in developing standards for the selection of apprentices.
- (6) make suggestions concerning testing and measuring the results of instruction.

15. **Related instruction for apprentices.** The modern apprentice needs much instruction in related mathematics, science, drawing, and trade theory. A certain amount of this is best given on the job. Another portion of it—and frequently the larger portion—is best given through group and individual instruction in school laboratories and classrooms.

The content of this related instruction has not always been determined as carefully as it should have been. When the State of Wisconsin enacted its state-wide apprentice law in 1911, the provisions included instruction in English, citizenship, business practice, physiology, and hygiene. Employers became suspicious of the encroachment of academic education so the law was changed in 1915 to place the responsibility for instructional content in the hands of the Industrial Commission and persons representing industry.¹²

The content of related instruction should be developed by those who are most directly concerned with it. The content should be

¹² Stewart Scribshaw, *Apprenticeship*, pp. 198-200.

directly related to the trade. It must be of evident value in developing trade skills and competencies. In addition to the technical instruction, it is desirable to develop social and economic insight, and attitudes and ideals without which no individual can render maximum service. Much of the latter, however, must be secured by apprentices through home-study and other means that will supplement formal apprenticeship as given through training on the job and through classwork.

16. Suggested content for related instruction. Among the not previously mentioned material available for teachers of related subjects is a bulletin issued by the State Board for Vocational Education, Indianapolis, Indiana.¹² It represents the results of a conference, the purpose of which was "to assist individuals to become more employable." The major portion of the report is devoted to a method of securing related technical content for the following trades:

Blacksmith, boiler-maker, carpenter, electrician, locomotive repairman, machinist, mason, mill mechanic, molder, pattern-maker, pipe-fitter, roll turner, sheetmetal worker and tinsmith, and welder.

Good instructional material has been put out by such national associations as: (1) The Trade Extension Bureau of the Plumbing and Heating Industries, (2) The Heating, Piping and Air Conditioning Contractors' National Association, (3) The International Typographical Union, (4) The United Typothetae of America, (5) the American Telephone and Telegraph Company, (6) the National Metal Trades Association, and (7) the National Founders Association.

Material is also available for clay-products industries, pulp and paper industries, granite industries, lumber industries, and others.

Many industries have developed excellent instructional material which is not generally available, but which may be accessible to responsible school authorities, and to non-competing industries.

¹² *Apprenticeship Training for the Carnegie-Illinois Steel Company, Chicago.* Issued by the State Board for Vocational Education, Indianapolis, Ind., October, 1930. (Mimeographed, 152 pages.)

17. Shop talks and demonstrations. For many years the National Metal Trades Association has advocated that shop talks be used to supplement learning by doing and classroom instruction. It has been suggested that such topics as listed in Table XXIV, be given by the instructor or apprentice supervisor and by executives.¹⁴

These topics are suggestive of similar ones that have been suggested by the same association for foundry apprentices. Lists of text and reference material are also included in the pamphlet to which reference has just been made.

18. Enriching related instruction. In Chapter VII, "Teaching Aids and Devices," references were made to a variety of teaching aids that function effectively in apprentice education. Among these are: instruction books, trade literature, such as comes to the desk of industrial teachers and supervisors in endless array, trade periodicals of many kinds and a miscellaneous collection of circulars, booklets, pamphlets, charts, diagrams, and other literature, much of which is both interesting and instructive.

Visual aids of many sorts, such as pictures, samples, slides, models, and films, are also suggestive as means of making related instruction more effective. Demonstrations by experts likewise stimulate interest. Inspection trips are motivating to apprentices.

Apprentices need to be taught how to study and how to use the library. Scholarship is needed in industry as in the professions. The time to develop study habits and familiarity with library techniques is in youth—not late in life. Books and periodicals are tools that enable men and women to achieve, that stimulate thought, and that serve as means of growth.

19. Health and safety education. Workers in industry should be taught how to preserve health. The requirements of health and how to safeguard health against industrial health hazards, such as dusts, poisons, and fumes, should be taught.

Safety education is of interest to employers as well as employees. Within limits, proper instruction in these matters can improve well-being. Instruction in industrial hygiene can be

¹⁴ Taken from *Co-operative Apprentice Plan*, The Metal Manufacturers' Association of Philadelphia, pp. 12-13. (Paper, 32 pages) (Used by special permission of the National Metal Trades Association)

TABLE XXIV

SHOP TALKS AND DEMONSTRATIONS FOR MACHINISTS

(Compiled by the National Metal Trades Association)

1. Safety first; care of machinery; short description of each machine, dwelling on lubrication, breakable parts, and cleanliness.
2. Name and describe the various small tools used.
3. Describe the various hammers and chisels used in the trade. Demonstrate the proper methods of using them.
4. Describe the different files used in the trade, their care, and how ordered. Stress cost.
5. Classification of scrapers, method of sharpening them. How to develop a true surface.
6. The use of hand and power hack saws. The use of dies and taps, backing off, lubrication.
7. Standards for bolts and nuts. How to determine the proper size drill to use for tapping. Kinds and uses of machine screws.
8. What to do before using a machine that someone else has used. Explanation of the drill press, methods of clamping work to table.
9. Describe the various clamps used in the shop. Demonstrate how to draw a drill when it has started off center. Describe the development of the drill from those used in prehistoric times.
10. Thorough description of the engine lathe and attachments. Show slides or cuts of parts. Demonstrate location of centers with a center square, and drilling same on sensitive drill. Facing ends of work.
11. Development of the engine lathe. Method of grinding tools, considering roughing and finishing cuts. Stress points which give rigid set-up to tools and work. Testing parallelism, calipering, touch filing.
12. Examples of cutting tools, considering angles of rake and clearance, as affected by kind and hardness of metal. Effect of height on angles of rake and clearance. When, where and why to use lubricants. Care of centers. Chattering, emery cloth or stick used on lathe.
13. Speeds and feeds. Proper speeds for various materials. Coarse and fine feeds, method of computing speeds. Method of throwing belts or speeding motor up or down.
14. Describe the shaper, methods of holding work, clearance of tools, methods of setting stroke, when, where, and why to feed.
15. Describe the planer, methods of holding work, clearance of tools, planer stops, proper stroke, elevating the rail, care of the ways.
16. Describe the milling machine. Methods of holding work. Use of the graduated dials. Mounting the cutter on the arbor. Relation between the direction of table travel and cutter revolution. Care of cutter, arbor, spindle and self.
17. Describe the grinding machine. Compare the emery stand, surface grinder, disc grinder, portable electric grinder, cylindrical, internal, and universal grinder, wet and dry grinding. Abrasives and wheels.
18. Chucks, kinds and advantages of each. Care, use and abuse.
19. Demonstration of truing work in an independent chuck. Examples of chuck work. Method of taking off.
20. Definition of standard tapers. Calculating the amount of setover and method of setting the tail stock out of line. Height of tool. Testing.

TABLE XXIV (Continued)

21. Definition of terms used in thread cutting. How to determine the kind of thread. The threading tool, its shape and height. Method of cutting a V thread.

22. Computing change gears, root diameter, depth of thread.

23. Description of the types of drills. Method of grinding. Use of collets and sockets. Care and cost of drills.

24. Demonstrate methods of centering work with a surface gauge. Show method of drilling centers with work held in lathe chuck, drill held in chuck in tail stock. Spotting for steady rest.

25. Describe the various types of lathes. Demonstrate locating centers with herma-phrodite calipers, drill centers with drill held in headstock spindle. Stress importance of true centers. Facing end of shaft.

26. Describe the various kinds and shapes of tools used. The advantage of the solid tool and the tool holder.

27. Describe the blacksmith's forge, tools used in forging, how to build a fire, and explain the heat required for hardening, tempering, case hardening and annealing.

28. Describe the various types of shapers. Explain purpose of the clapper box and how to set it for side cuts. How to set the swivel chuck to an angle.

29. Countersinking in the drill-press, spot facing, counterboring, stressing and clearance for these tools.

30. Setting over tail stock by means of a model piece. Also by turning to two diameters. Demonstrate.

31. Show treatment of tool steels by means of lantern slides or cuts from current engineering magazines. Explain the composition of various metals and their use in industry.

32. Review speeds and feeds. Estimating cost of certain jobs. Time necessary to take cuts.

33. Angular cutting on the shaper and planer. Method of setting head for cutting bevels. The importance of taking feed pin out when machine is stopped.

34. Describe the different kinds of planers.

35. Describe the various types of milling machines, also the various types of cutters. Explain the use of the index head. Give examples of direct indexing.

36. Indirect indexing.

37. Reamers, kinds, use, methods of holding when in use, amount of stock to leave for reaming. Use of compound rest in boring tapers.

38. Method of starting a drill true when drilling in a lathe. Calipering holes. Spring of boring tools.

39. Self-care and care of equipment.

40. Describe the construction of vises and benches. Review small tools. Cost of small tools. A place for everything, and everything in its place.

41. Examples of chipping; chipping a keyway; chipping a keyseat; correct method of grinding chisels; how to tell when a chisel is tempered properly.

42. Files, hand cut and machine cut; trace their development; file handles; cross filing; diagonal filing; draw filing; fitting keys, cost of files.

43. Review scraping and lead up to flowering. Emery and artificial abrasives, origin and uses.

44. Describe threading dies. Machine and hand taps, taper, plug, and bottoming taps. Special threading and tapping machines.

TABLE XXIV (Continued)

45. The micrometer. Review bolts and screws and problems in finding proper tap drills.
46. Use of boring bars in the drill press. Use of vise for holding work on the drill press. Use of the keyseat rule.
47. Cutting tapers with compound rest, and with the taper attachment.
48. Cutting U. S. S. threads, external and internal; cutting square threads; removal of chips before trying thread gauge.
49. Manufacture of steels, continued.
50. Cutting left-hand, and also multiple threads.
51. Undercutting on the shaper. Methods of preventing the tool from catching on the return stroke. Cutting keyways and similar operations. Review method of getting proper stroke.
52. Grind the proper angles for cutters. Abrasives, why, when and where used.
53. Gear cutting; indirect indexing; computing number of teeth, depth, outside diameter, etc.
54. Cutting a helix in the miller; computing change gears for same.
55. Cutting acme and worm threads.
56. Boring work clamped to face plate; use of angle plate in the lathe.
57. Boring work held on the lathe carriage. Boring in the miller.
58. Review thread terms, shape of threads, safety devices.
59. Review method of computing change gears.
60. Review small tools and their use; die making; fixtures.
61. Review hammers, chisels, files, scrapers.
62. Review tools and tool holders, their advantages and disadvantages.
63. Review feeds and speeds; threading and tapping; self-opening dies and collapsing taps.
64. Review shaper and planer.
65. Cylindrical and surface grinding.
66. Review essentials to be considered in parallel turning.
67. Review methods of turning and boring tapers.
68. Review cutting tool materials, case hardening, pack hardening, carbonizing, tempering.
69. Problems in estimating cost of jobs; figure time required to complete certain jobs.
70. Compound gearing.
71. Knurling; its use on tools and machine parts. Methods of coloring tools. Proper methods of marking fine tools.
72. Review of milling machine (plain).
73. Review of milling machine (universal).
74. Review of cutter grinding.
75. Repairs.

given incidentally but effectively whenever there is a need for it. The closer it is related to the job, the better.

Decayed teeth, bad tonsils, impaired vision, faulty hearing, nasal obstructions, skin defects, and orthopedic defects are far more common among employed youth that is commonly realized.

Other defects and handicaps are also found. A prominent authority on health education says that "most adults are absolutely unapproachable in the matter of learning health." His belief is that health habits should be established early in life.¹⁵

20. Correspondence instruction for apprentices. Much useful material for apprenticeship training is available through private correspondence schools, such as the International Correspondence School, Scranton, Pennsylvania, and the American School, Chicago. The International Text Book Company, a subsidiary of the International Correspondence School, has published lesson sheets covering a four-year apprenticeship in carpentry. This material was developed in cooperation with tradesmen and vocational education experts in New Jersey.¹⁶ Other material suitable for apprentice education in other trades can be found by referring to the catalogs of such correspondence schools.

The International Printing Pressmen and Assistants' Union of North America maintains a technical trade school for the promotion of craftsmanship at Pressman's Home, Tennessee. The union also conducts correspondence courses for apprentice pressmen.

Instructional material for apprentices and other workers is also available through various public agencies, such as the Engineering Extension Divisions of the Pennsylvania State College and other state colleges or universities. Catalogs describing the material or the courses that are available are supplied free of cost upon request.

The instructional material that is available through private and public agencies is extensive. The better material is so compiled that it can be adapted to individual differences and varying local requirements. Effective apprenticeship instruction involves departing from formal and academic ways of teaching.

21. Apprenticeship a cooperative enterprise. There are numerous indications that industry is realizing that it needs the assistance of schools in providing adequate apprentice training. As has been mentioned, the amount of related mathematics, science,

¹⁵ *Education of Employed Youth, Proceedings of a special conference on*, pp. 43-8, Albany, N. Y., University of the State of New York, 1927.

¹⁶ New Jersey Department of Public Instruction, Vocational Division. *Organized Instruction for Apprentices*, Circular 18, 1923.

drawing, and trade theory that is required today far exceeds the amount that can be given on the job.

The increased mobility of labor and the modern tendency to move from one job to the next have made it increasingly hard for the smaller employers, or local labor groups, to finance such training programs alone.

The success of state supervised apprenticeship in Wisconsin, where state-wide standards have long been maintained, indicates that similar state-wide programs are worthy of serious trial.

Federal and state aid for apprenticeship, as provided under the Smith-Hughes and George-Deen Acts, has greatly stimulated participation in apprenticeship training on the part of public schools. The work so far accomplished has revealed to such skeptics as there were that the vocational schools of America can meet the challenge.

Both private and public trade, technical, and vocational schools in the several states are giving effective, functioning instruction to apprentices.

22. Part-time classes. A common form of instruction is to arrange for a certain amount of related instruction—such as four hours per week—which supplements the practical training on the job. Whether this part-time instruction is an integral part of the part-time school program of the state, as it is in Wisconsin, or whether it is organized as it is in most other states, on a somewhat different basis, is not the most fundamental issue. Effective apprentice training on part-time bases is being conducted widely.

Before any program of instruction is undertaken, a searching study should be made to determine the nature and extent of the training to be given. Schedules for classroom and laboratory instruction should be worked out in detail.

No plant is too small or too specialized to cooperate in the development of a community program of apprenticeship. If the resources and training opportunities in a plant are highly specialized, it is possible to interchange apprentices with other plants. It may also be possible to supplement the training given in the industry by manipulative as well as non-manipulative

instruction provided through part-time and evening classes in schools.

Various forms of individual and group instruction, which has been discussed in preceding chapters, can be adapted to apprentice training.

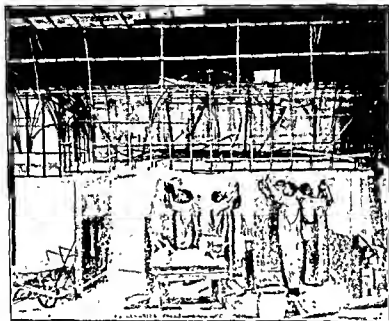


FIG. 51. Apprentices receiving instruction in ornamental plastering under the auspices of the Detroit, Michigan, public schools.

23. Part-time cooperative education. Part-time cooperative education is a form of part-time instruction in which the individuals alternate—usually in periods of two weeks—between the schools and industry. Schedules are arranged so that pairs of students alternate so that one is always “on the job.”

The methods of teaching do not differ materially from those used in other forms of vocational education. There are some problems in organization and administration, not here discussed, that must be worked out in order that such programs can function effectively.

24. Evening classes for apprentices. Many evening classes are conducted for apprentices by public and private schools. Some of the larger corporations and employers likewise operate schools for apprentices. An example is the Westinghouse Technical Night School, East Pittsburgh, Pennsylvania. Students often attend evening classes for two evenings of two hours each, per week. Some vocational schools are open every evening except Sundays and holidays during the school term.

Reports indicate that many "subjects" are taught in evening schools. Among them are aviation, radio repair, beauty culture or cosmetology, baking, meat cutting, photography, refrigeration, acoustics, air conditioning, diesel engines, and hundreds of other interesting courses.¹⁷

25. Apprentice training by corporations. Some idea of the scope of training that is undertaken by industries may be gained from the following varieties given by the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania: courses for office boys, noon lectures, discussion clubs, war memorial scholarships, summer conferences for engineering teachers, course for U. S. Government naval officers, evening courses, day apprentice courses, supervised shop experience, foreman and leader training, and cooperation with such educational institutions as the public schools, colleges, and correspondence schools.

The Lakeside Press, operated by R. R. Donnelley and Sons Company, Chicago, trains apprentices for printing and other graphic arts. It has a program for elementary school graduates, one for high school graduates, and one for those with less than four years of high school training. The company also arranges for instruction for boys who attend high schools part-time and cooperates with colleges giving cooperative education. Training is also given to special groups, such as foremen, executives, and printing engineers.

It is not to be inferred that the scope of these corporation training programs is typical of the extent of corporation training. But it is representative of what many employers and corporations are doing in apprentice and other training.

¹⁷ For a discussion of methods of teaching, see chapter on adult education and refer to alphabetical index.

PRACTICAL SUGGESTIONS FOR TEACHING

It now remains to call attention to a few points that may prove of value in apprenticeship education.

1. Teaching content should be selected with the aid of advisory committees.

2. *Learning through doing is right, but needs to be supplemented by related instruction.*

3. Vocational education received through apprenticeship should be supplemented by voluntary, personal effort in areas of non-vocational or general education.

4. *The apprentice of today is the foreman and executive of industry tomorrow.* Keep alive within him and nourish his desire for continuous growth.

5. Mechanical skill of the first order, combined with intelligence and personality, is always in demand.

6. Apprentices are workers, not school children; they should be treated like adults—not like adolescents.

7. Traditional classroom methods of teaching are poorly adapted to teaching apprentices—informal methods are better.

8. The subject matter in apprentice training must reflect the latest approved trade practices and requirements.

FOR DISCUSSION

1. Suggest how terms of apprenticeship may be stated or defined in terms of accomplishment rather than in hours served.

2. What are the chief advantages of trade advisory committees?

3. Make a list of, and report upon, trade pamphlets, booklets, and catalogs suited to apprentice education.

4. State how modern apprenticeship differs from the older.

5. Report upon several types of apprenticeship that are conducted in your community or one of your acquaintance.

6. Interview one or more journeymen or masters and report upon their convictions about apprenticeship.

7. Describe the Wisconsin plan of apprenticeship.

8. Report upon the Federal Apprenticeship Commission.

9. What are the duties of an apprentice coordinator?

10. How may guidance be related to apprentices?

11. What is the attitude of labor toward: (a) part-time education, (b) evening classes, (c) corporation training, (d) public apprentice education?

12. Explain the attitudes of representative employers toward the four forms of education mentioned in the preceding item.
13. Compare apprenticeship in the building trades with that in the metal trades.
14. Compare apprentices with high school students.
15. Compare the teaching content of courses designed for all-day vocational schools with those for apprentices.
16. Describe one or more types of plant training.
17. Compare "special" training with apprentice training.
18. What are the advantages and limitations of floor training?
19. Explain what is meant by "up-grading" training.
20. Mention several methods of instruction that are well suited to teaching apprentices.

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CHAPTER XXII

EXTRA-CURRICULAR AND CLUB ACTIVITIES

GUIDING GOALS AND TECHNIQUES

1. **Meaning and purpose of extra-curricular activities.** One of the conspicuous trends in modern education is the fast-growing favor for the so-called extra-curricular activities. Readily evident, far-reaching changes have come into American life during the last half century. The original provisions for instruction as made in the grammar schools and academies were quite inadequate to meet the new demands.

At first the school authorities were afraid to give recognition to these newer activities—at least as a part of the “regular” school curriculum. So the term *extra-curricular* came into use. It expressed fairly well the attitude then prevailing toward these activities.¹

Modern practice has included in the curriculum many of the activities that were formerly extra-curricular. A recent report by the Philadelphia Board of Education states that high school pupils have indicated that home economics is the most popular course in the whole curriculum and that industrial arts ranks second.² It is impossible to make two lists of activities, one of which contains curricular and the other extra-curricular activities, for some schools offer as curricular what others provide for through extra-curricular activities.

“Extra-curricular activities,” says Jordan, “are those voluntary tasks which are carried by pupils in addition to the regular classroom requirements, either after regular school hours, or at a time within the program especially designated for such purposes, and may be in effect semi-curricular.”³

¹ Paul W. Terry, *Supervising Extra-Curricular Activities*, Chapter I, “The Origin and Growth of Student Activities.”

² See *Philadelphia Inquirer*, November 3, 1937, “And Home Economics Tops the List.”

³ R. H. Jordan, *Extra-Classroom Activities*, New York, Thomas Y. Crowell Co., 1928.

Extra-curricular activities are not on the regular school schedule and credit leading toward promotion or graduation is usually not given for them.

These activities are chosen because of enjoyment and benefit that is anticipated. These may be physical, mental, emotional, cultural, social, or vocational. They are frequently selected because they provide opportunities to play or work with acquaintances and friends. They are a source of self-expression for many, and for some a means of escape from routine or undesirable working or living conditions. Many select extra-curricular activities that enable them to select or to further hobbies.

The following statement of the purposes of extra-curricular clubs was prepared by the Department of Guidance of the Reading, Pennsylvania, Senior High School:

The purposes of clubs in the Reading High School are to promote intimate good fellowship, to provide relaxation from school routine, to afford opportunities for developing individual hobbies and aptitudes, and to create an interest in worthwhile pursuits.

All clubs are conducted chiefly by the students themselves. The members elect their officers at the first meeting, and committees are appointed when needed, to function in various ways. The sponsor, through suggestions and advice, is responsible for and directs all activities.

New clubs are organized, whenever feasible, upon request of at least ten students. Any student registered for a club is expected to remain in that club for at least one semester, until he tries out its activities. New organization is held at the beginning of each semester.

A complete list of our present clubs will be found on the home-room program for the first week.

2. Differences between entertainment and play. A hobby is essentially a play activity. Hobbies are undertaken for enjoyment and recreation. A distinction should be made between *entertainment*, which represents a *passive* kind of enjoyment, and *play*, which implies *active* participation. We are frequently entertained by others; we must play ourselves.

Extra-curricular activities are, at heart, hobby and constructive play activities which involve personal effort and participation. It is no wonder that such doings are popular. They give satisfactions that arise from creative effort exerted in response to strong behavior tendencies and intriguing play situations.

Entertainment may be interesting but play is challenging; entertainment may be instructive but play is exciting and gripping, as passive experiencing cannot be.

The automobile and the radio are of tremendous value to man, but they cannot replace personal effort and achievement. Self-activity must have its proper outlets.

3. **Types of extra-curricular activities.** Extra-curricular activities should supplement curricular requirements. And since individuals differ greatly in interests and capacities, it is axiomatic that these activities should be as broad in scope as economic and other circumstances permit. The condensed list is indicative of the range of extra-curricular interests.

TABLE XXV

A LIST OF SOME EXTRA-CURRICULAR ACTIVITIES

- | | | | |
|--------------------------|--------------------|--------------|---------------|
| 1. Archery | | | |
| 2. Assemblies | | | |
| 3. Athletics and Health | | | |
| (a) Baseball | (d) Fencing | (g) Handball | (j) Wrestling |
| (b) Basketball | (e) Football | (h) Soccer | |
| (c) Boxing | (f) Gymnastics | (i) Track | |
| 4. Birds | | | |
| 5. Commercial art | | | |
| 6. Dancing | | | |
| 7. Debating | | | |
| 8. Drama | | | |
| 9. Fine arts | | | |
| 10. Home economics | | | |
| 11. Industrial arts | | | |
| (a) Wood | (f) Leather | | |
| (b) Metal | (g) Plastics | | |
| (c) Art metal | (h) Ceramics | | |
| (d) Electric | (i) Textiles | | |
| (e) Printing | (j) Home mechanics | | |
| 12. Literature | | | |
| 13. Mathematics | | | |
| 14. Music | | | |
| 15. Photography | | | |
| 16. Safe motoring | | | |
| 17. Safety and First Aid | | | |
| 18. Science | | | |
| 19. Stamps and Coins | | | |
| 20. Social sciences | | | |

4. **Organizations furthering extra-curricular interests of youth.** There are many organizations promoting programs that

appeal strongly to youth, which may be regarded as extra-curricular. Space does not permit mentioning more than a few representative organizations, such as:

1. Boy Scouts of America
2. Girls Scouts of America
3. Camp Fire Girls
4. Four H. Clubs
5. Future Farmers of America
6. Junior Red Cross
7. Young Men's Christian Association
8. Young Women's Christian Association
9. Woodcraft League of America
10. Leisure League of America
11. Boys Clubs of America
12. Boy Rangers
13. National Recreation Association

5. The home-workshop movement. A considerable portion of the literature dealing with hobby, leisure-time, and extra-curricular activities refers to things to be done. Extensive as are our school facilities for such activities, they can serve but a relatively few of the total population. One answer, among several, to this situation is the home-workshop.

Increased urbanization, mechanization, and specialization are depriving thousands of ready access to constructive and creative work involving manipulative effort and skills. It is such circumstances that are impelling school authorities and others to urge a workshop on every farm and a work-bench in every urban home.

In many sections of this, and other countries, there are revivals of the home crafts. Schools are aiding in this development. Because of his training and experience, the shop teacher is in a position to help in a number of ways. And since the goal of teaching industrial education should be to encourage learning, to disseminate truth, and to teach socially useful habits, skills and attitudes, we shall give further consideration to how this can be done through craft clubs and craft hobbies.

6. Encouraging home-workshops. There are numerous ways in which the home-workshop idea is being spread. Commercial concerns have sensed the possibilities and have responded by an array of home-workshop tools, machines, and benches. Much ad-

vance has been made in small, low-priced, and yet quite satisfactory, portable machinery.

Exhibits at bobby fairs are popular everywhere. That such exhibits stimulate youth and adults to similar efforts is to be expected.

The increased space in newspapers, periodicals, and books devoted to craft and other hobbies is likewise a factor in stimulating such efforts.

There are likewise many ways in which teachers encourage the development of home-workshops. Some of these are:

(1) *Through students in day classes.* A good method of interesting persons in home-workshops is to start with the students in the day schools. A variety of suggestive home-workshop plans can be prepared with their help. These can be duplicated through blue-printing, mimeographing, or other devices. Minimum lists of essential tools to be used for various activities can likewise be prepared for distribution. Students will gladly look up reference readings related to their own extra-curricular interests. These can be prepared for distribution. Libraries will cooperate by displaying prominently books relating to home-craft activities and by getting out reading lists based upon available material.

Cost data can be prepared with or without pupil participation. Such data are helpful to full-time pupils as well as to others who attend part-time or not at all.

Pupils may be encouraged to supplement the time spent in school shops with practice at the home work-bench. Not infrequently pupils are unable to complete their school projects in the time available. If they have the facilities at home, it is a good plan to encourage them to complete the projects there.

(2) *Through parents.* The home-workshop appeals to fathers, not only as a means of personal relaxation but also as a means of comradeship with his children and neighbors' children. The first approach may be made informally whenever the opportunity occurs. It may be at any meeting where the matter can be presented. One way is to invite the fathers to see the students at work in school, and use that as a point of departure for suggesting the home-workshop. If a parent can be prevailed upon to tell

about his own experiences with a home-workshop, so much the better.

(3) *Through service and other clubs.* Another approach is through adult clubs, such as service clubs, foreman's clubs, volunteer fire companies, parent-teacher associations, and athletic or sporting clubs. It is not necessary that the club shall have educational objectives. Most of them are willing to permit a representative of the schools to present a matter of common interest—such as home-workshops.

(4) *Through displays and exhibits.* Displays and exhibits in store windows will prove interesting and suggestive, especially if combined with judicious publicity. People are interested in who made the articles; so attractive name cards are appropriate.

Practical demonstrations by pupils are always interesting. Each display, exhibit, or demonstration should tell a story.

(5) *Through visual aids.* Still pictures, slides, and movies can all be used to advantage in supplementing other methods of legitimate publicity and instruction in how the home-workshop may serve many worth-while purposes and how such facilities can be provided.⁴

7. Fireside occupations. As the number of individual craft workers increases, they band together just as do artists and craftsmen in building, metal, and other trades. They form clubs, leagues, or guilds that have as their objective the improvement of craftsmanship, the betterment of their products, and the expansion of markets.

Under the leadership of Governor Winant a state commission was appointed which resulted in the League of New Hampshire Arts and Crafts. In the West the federal government is setting up regulations so that the native crafts of the American Indians shall no longer be infringed upon by domestic and foreign factory-made products. Indian-made rugs, pottery, and jewelry are stamped. Articles must not be labeled "Indian-made" unless they are produced by American Indians. Here and there socially minded individuals and groups are helping the Indians to market

⁴For a good discussion of how to organize and operate a home-workshop, see "The Home Work Shop Organization," by Ross C. Cranlet and William F. Hunter in *Industrial Arts and Vocational Education*, 25:259-61, September, 1926.

their craft products. The Indian schools are teaching the young people the almost forgotten arts of their ancestors. An important annual inter-tribal Indian Ceremonial is held at Gallup, New Mexico. Here Navajo, Zuni, Hopi, and some two dozen tribes of the Southwest participate in what is said to be the only all-Indian celebration in the world. Here, also, they exhibit their finest art at the exhibition hall.



FIG. 52. Illustrating a home construction project. Even though the day was a hot one, these boys preferred laying shingles to less strenuous activities.

In the South there has been formed the Southern Highlands Handicraft Guild. This organization takes in work centers in several states. In New York, Pennsylvania, and elsewhere the "fireside occupations," or "home industries," are being revived. Communities that formerly thrived on lumber, coal, oil, and other natural resources, which have gradually dwindled, are turning to home industries as a partial means of support.⁵

8. Equipping the home-workshop. Shop teachers can be of considerable help to those who are faced with the problem of equipping the home-workshop. Teachers are familiar with what should be bought and where it may be secured. They know where tools can be purchased at prices that are right. For those who

⁵For a well-written description of this movement, see "Home-made and Hand-made," by G. A. McGarvey, in *School Life*, February, 1934.

cannot afford new tools and equipment, used ones can sometimes be obtained.

The trade and professional literature with which teachers are, or should be, familiar, makes frequent reference to homemade devices that are thoroughly practical and relatively inexpensive. Such reference material is very acceptable to persons interested in extra-curricular activities of the crafts type.

In purchasing tools and equipment, quality should be considered as well as the original cost. There are important differences in quality that are noticeable and others just as fundamental that cannot be detected through observation, but which will show up quickly in use.

In general, the homeshop equipment should be simple, relatively inexpensive, sufficiently varied to meet the demands, and selected for the kinds of service that are expected from it.

9. Reference material for craft activities. A very helpful list of books and magazine articles relating to leisure time, avocational, and extra-curricular activities has been compiled by Fred J. Schmidt.⁶ He has divided his bibliography into 60 functional groups.

An alphabetically arranged index of shop kinks has been compiled for hobbyists, craftsmen, students, and teachers by J. L. McConnell and L. B. Applegate.⁷ The authors confined their references to four magazines that are widely read by those for whom the index was prepared. The periodicals are: *Industrial Arts and Vocational Education*, *Industrial Education*, *Popular Mechanics*, and *Popular Science Monthly*.

Care and Feeding of Hobby Horses, by Earnest E. Calkins, contains an extensive bibliography with 218 groupings, each related to leisure time, hobby, or extra-curricular activity. Other booklets in the Series are also of interest to students, teachers, and home crafters.⁸ For other references, see Chapter XVII,

⁶ Fred J. Schmidt, *Leisure Time Bibliography*, Ames, Iowa, Industrial Arts Department, Iowa State College, 1935. (Mimeographed, 84 pages)

⁷ J. L. McConnell, and L. B. Applegate, *An Index To Shop Kinks*, Ames, Iowa, Industrial Arts Department, Iowa State College, 1936. (Mimeographed, 90 pages)

⁸ Earnest E. Calkins, *Care and Feeding of Hobby Horses*, New York, Leisure League of America, 30 Rockefeller Plaza. Paper cover, 104 pages, price 25 cents

"Teaching Aids and Devices," and consult the Alphabetical Index.

10. Promoting extra-curricular activities. There are a few conditions that need to be met if extra-curricular activities are to be successful. These include: (1) sympathetic interest and support of school administrators, (2) club sponsors who are prepared to serve as leaders, (3) club members who are, or can be, interested in the activities selected, and (4) suitable housing and equipment.

The first of these four conditions is easy to meet, for there are few persons holding positions of responsibility who do not value extra-curricular activities when pursued reasonably. Probably most schools have well-founded restrictions on the number of extra-curricular activities individuals may carry. The second condition, qualified club leaders, is not so easy to fulfill. In many instances the leader must learn through practice—it is up to him to keep ahead of his group.

The third factor, interested students, calls for a reasonable degree of selection and guidance at the outset. The club leader should explain, carefully, the nature, scope, and requirements of the work that is to be undertaken.

Extra-curricular activities can be housed wherever the best provisions can be obtained. It is not necessary to limit the place of meeting to the school building. In fact, some activities must be carried on out of doors, sometimes at considerable distance from the school. In promoting extra-curricular activities it is worth while to keep in mind the fact that students must be given incentives that will result in habits of spending time profitably.

Carion Ross has said: "We have worshipped too much at the altar of mass production which means uniformity, standardization, and mediocrity. It seems to me that with the heritage of all the races in this country we should be able to show skill and appreciation for the good and the beautiful. Our machine-made mass production has stressed the ready-made things because they are cheap. As a result, instruction in the arts and crafts has received a formal but wrong emphasis. Our instruction in these subjects (arts and crafts) must stress craftsmanship and the

pleasure that comes from making a fine piece of work that is not only beautiful but useful."²

Suitable promotion of extra-curricular activities can be furthered through homeroom guidance. Perfunctory homeroom time-killing can be replaced by effective counseling.

The school assembly can supplement other means of acquainting pupils with the nature of extra-curricular activities that are sponsored by the school.

The school can adopt a slogan, such as "Every pupil a member of one or more clubs." School publications can feature news items and articles dealing with clubs. Through proper guidance pupils are aided in selecting clubs and in restricting the selection to such activities as will help and not hinder their best and fullest development.

11. Suggestions for developing craft hobbies. A few suggestions can be offered that may be of value to beginning teachers who wish to lead school craft clubs or hobby craft clubs composed of persons not enrolled in school. They are:

(1) *Find out the pupil's present interest.* Begin, if possible, by using the pupil's present dominant avocational interest. Let him try his hand at the thing he wants to do most of all. But make reasonably sure that he will be able to carry out what he starts.

(2) *Deepen his interest.* Manipulate the setting so that he will see more to the thing he started than what was at first apparent to him. Lead him to see relationships, unsolved problems, and values that are new to him.

(3) *Broaden his horizon.* Let the manipulative work be the entering wedge that will reveal hidden sources of interest. Strive to make the manual activities serve as the vehicle or means of much related insight, appreciation, and understanding.

(4) *Make success probable.* Let the projects or units of work be such as will challenge his abilities, but also such as will bring the sweet feeling of successful accomplishment.

(5) *Stress try-out and guidance.* With pupils of junior high

² Carmon Ross, "The Arts in the New Leisure," *Bucknell Journal of Education* 8.9-13, January, 1934.

school age stress activities that have significant guidance, try-out, and exploratory values.

(6) *Use methods that make for freedom.* Hobby and avocational interests develop best in an atmosphere of informality and freedom. This same sense of freedom is fortunately invading the "regular" curriculum where formal, traditional practices have retarded the development of initiative and creativeness.

(7) *Teach pupils to select constructive activities.* Satisfaction is usually related to the degree of success one has in what is undertaken. The fisherman who catches few fish soon becomes discouraged. Teach pupils to select activities that are constructive and creative in nature. As skill develops, interests will deepen and life-long habits of work may be established. Youth thrills as a result of constructive, rather than passive, activity. Lasting enthusiasm comes from repeated successful accomplishment.

12. **Procedures in organizing clubs.** When planning a program of extra-curricular club activities, some such procedure as the following one may be used:

- (1) Find out what club activities the teachers are competent to handle. Let each instructor indicate his first, second, and third choice.
- (2) Study the returns of the inquiry just mentioned and compile a list of offerings.
- (3) A brief description of purpose and nature of each offering should be issued in printed or mimeographed form to the students.
- (4) A schedule is prepared, which shows when each of the offered club activities will meet, and where it will assemble. The name of the sponsor is usually given.
- (5) Pupils should be encouraged but not forced to join a club. They should likewise be advised not to join too many. Definite limits should be set.
- (6) The first meeting or two may be considered in the nature of an orientation and try-out experience. After that, transfers should be discouraged except where good reasons exist for making a change.
- (7) Pupil participation in management should be encouraged by electing officers, each of whom is given definite responsibilities. The instructor serves as counselor and adviser.
- (8) Encourage, among others, extra-curricular and avocational interests that fit into normal home life. The home should become more of a center of activity rather than merely a place to eat and sleep. Such interests as music, literature, photography, and the arts and crafts

can enrich home life and help to strengthen and cement family ties and relationships.

13. Suggestions for club sponsors. The following suggestions illustrate where teachers can place emphasis to advantage:¹⁰

- (1) Stress such benefits as training in parliamentary procedure, cooperative effort, sacrifice of self-interests to those of the group, acceptance of responsibility and full discharge of duties, developing initiative and leadership, and providing an opportunity to learn more about any field of special interest.
- (2) Impress upon the students the necessity for careful choosing, since they must, as a matter of character, abide by the choice made, remaining in the club for the entire semester, until they have fairly and squarely tried out its activities.
- (3) Urge students to offer suggestions of new types of clubs in which they may be interested.

14. The club leader as counselor. The friendly relations that normally develop between students and club sponsors, coupled with the opportunities that the sponsors have to learn to know each individual in the group, supply conditions that are conducive to effective guidance. And since guidance is not a matter solely for the guidance office, but one in which each teacher should have a part, it follows that the club sponsor should feel responsible for rendering such service in cooperation with others.

This problem is acute enough with full-time students, but when the sponsor is working with adults there will be many opportunities when his counsel and advice may do much good.

Estimates based on data available to the Committee on Youth Problems, United States Office of Education, indicate that out of 20,100,000 persons 16 to 24 years of age¹¹

4,000,000 are in full-time schools and colleges.

500,000, not employed, are taking part-time schoolwork.

2,800,000 are married women, unemployed and not in school.

7,800,000 are employed at full- or part-time, non-relief jobs.

300,000 are out of school and unemployed, but not seeking employment.

4,700,000 are out of school, unemployed, and seeking jobs.

¹⁰ *The Home Room Guide*, Department of Guidance, Senior High School, Reading, Pa., p. 7. (Used by special permission of the publisher.)

¹¹ Estimates were made as of November, 1933. See, *Youth—Education for Those Out of School*, Bulletin 1936, No. 13-111, Office of Education, Washington, D. C.

These figures indicate that the task of adjusting unemployed and partly employed persons to remunerative employment is a large one. How may club sponsors and other industrial teachers help?

15. **Helping young people to get jobs.** The club sponsor or the industrial teacher who is counseling young people with respect to securing work may find it worth while to include such suggestions as these. When interviewing a prospective employer:

- (1) Do not use slang.
- (2) Avoid such inappropriate pet phrases as: "listen—," "you-know."
- (3) If a boy, remove your hat when you step into the office.
- (4) Do not offer to shake hands—let the employer take the initiative, but meet him cordially.
- (5) Do not put your hat on the employer's desk.
- (6) Do not chew gum during the interview.
- (7) Do not sit down unless asked to do so.
- (8) Do not try to read the correspondence that may be on the employer's desk.

These are some of the things the applicant may be urged to do or to check on. He may be cautioned:

- (1) See to it that you are clean—hands, face, and clothing should show cleanliness. Your clothing may be worn or patched but it should be clean.
- (2) Comb or brush your hair neatly.
- (3) Fingernails should be presentable—not bitten off, too long, or dirty.
- (4) Clothing should be pressed or laundered suitably.
- (5) Shoes should be shined or polished.
- (6) Act naturally and respond naturally to unforeseen circumstances. If you find a letter or newspaper on the floor, pick it up. It may have been put there to see what you will do about it.
- (7) Tell the truth.
- (8) Dress appropriately—not loudly.
- (9) Indicate your willingness to do your best.
- (10) Express your appreciation if given employment.

16. **Helping adults to secure work.** Sponsors of hobby and craft clubs for adults and shop and drafting teachers in the part-time and evening schools often learn of adults who need help in making occupational adjustments.

Experience indicates that one of the essential qualities in such a club sponsor or teacher is his *ability to re-instill self-confidence* and optimism in those who have unsuccessfully tried to get employment. Constructive handwork is often a means of bolstering up a vanishing self-confidence, for it gives persons a sense of accomplishment.

The background of industrial experience and familiarity with working conditions in industry are useful in counseling adults. The shop teacher can "talk the language" of the industrial worker. The industrial worker has more confidence in those who know industry "first hand" than in those whose knowledge was gained vicariously.

The school-sponsored club and part-time and evening classes offer unusual opportunities, not only to meet adults who are groping for something to do but also to adapt the activity or instruction so that it will strengthen the points of greatest need.

About one-third of the unemployed adults who found work in some cities during the years when jobs were hardest to secure created jobs for themselves by doing something that they had not done before. The cleverness that was shown in many instances was remarkable.

Adults who are unemployed may be given advice such as this:

- (1) Industry is run for profit. The best way to secure a job is to *sell your service*. Jobs are seldom granted to people merely because they need them.
- (2) In looking for work do not restrict your efforts to persons or corporations that are known to be doing a good business. It may be that you have what is needed to stop the loss for someone who is not succeeding so well. Such employers are as much in need of help as is the person who is looking for work.
- (3) Dress appropriately—according to the requirements of the work that you expect to do. If manual work is involved, carry your overalls with you.
- (4) In some of the skilled trades the worker is expected to have his own kit of tools. Have them in first-class condition and with you, if possible. Mechanics are judged by how they keep their tools.
- (5) Make sure that you know about the latest developments in your line of work. Use the library. Study the trade journals and ask the librarian to help you locate the information you want.
- (6) If you lost your last job through some fault of yours, do not hesi-

tate to say so, if asked about it. The employer will respect you for being truthful and for your courage to admit it. Do not attempt to bluff.

- (7) Ask for work in the spirit that you have something worth while to offer—something that will be beneficial to the prospective employer as well as to you. Avoid the mistake so often made of saying: "You don't happen to have a job for me, do you?" Make your approach as does the successful salesman.
- (8) Let your friends know that you are looking for work. Ask them for suggestions as to where it may be secured. Put away false pride. "The worker is worthy of his hire." All honest work is honorable.
- (9) Read the papers. Keep in circulation.
- (10) Keep at it. The fact that an opening was not there a week ago does not prove that the same is true today.

17. Clubs for unemployed youth. The startling growth of clubs for unemployed and out-of-school youth may be judged from what New Orleans, Youngstown, Ohio, and many other centers have experienced. In Youngstown, some 50 clubs of this sort were organized on a neighborhood basis. They had a membership of 3000. Two members of the school staff devoted much of their time to them. Ten or twelve emergency relief teachers were assigned to assist in the work. Various agencies, such as the Y. M. C. A. and the Big Brothers groups, cooperated. The Youngstown Board of Education has assigned eight obsolete school buildings and a half dozen other buildings to this enterprise. These buildings have been remodeled into satisfactory club-rooms by the young men. Other facilities, such as settlement houses, park buildings, basements, and barns, were pressed into service. A central organization, in which each club had representation, was set up. Each club has an adult supervisor or adviser.

In the rural areas clubs for older 4-H Club members have been organized in different sections of the United States. California reports such clubs in 27 counties of the state.

Iowa reported 46 rural young people's clubs of the discussion type. The membership was estimated to be in the neighborhood of 2500 persons between the ages of 18 and 30. Other states and communities are likewise sponsoring similar club activities.¹²

Instruction in the crafts is being given in a number of states

¹² *Ibid.*, pp. 36-40.

through the State Board for Vocational Education cooperating with the Works Progress Administration. In New Mexico village handicraft industries have been developed that use local raw materials. At Anton, Chico, and Toas cloth and blankets are made from the raw wool. Elsewhere hides are tanned and leather is worked. Pottery and tile are other products that are produced.

In Madison, Wisconsin, craft classes of unemployed youth



FIG. 53. A model boat club. The boys meet Saturday mornings in one of the Detroit Schools.

make pottery, metalware, rugs, and other articles. These examples are merely representative of what is being done on a wide scale.

PRACTICAL SUGGESTIONS FOR SPONSORING CLUBS

In the light of the discussion in this chapter, let us draw attention to a few of many points that relate to the work of the teacher or club sponsor.

1. Informal methods are superior to formal class methods in handling club activities.

2. School-sponsored, extra-curricular clubs should be run by the pupils themselves. The sponsor's job is to counsel, advise, and help.

3. Extra-curricular activities should be optional—not compulsory—but when they are selected, the pupil is expected to give the activity a fair trial.

4. "Skill," says L. P. Jacks, the distinguished editor and author, "is important for labor—we all know that. What we have not yet realized as we ought is that skill is equally important, perhaps more important, for leisure."¹³

5. A large proportion of industrial arts and vocational industrial teachers are called upon to sponsor one or more forms of extra-curricular activities. Special preparation is desirable. It is suggested that the teacher develop a card index relating to his areas of special interest and that he develop a personal collection of books, magazines, and other literature relating to the activities.

6. The craft club is an ideal place to develop knowledge, appreciations, and the ability to think and to work creatively.

FOR DISCUSSION

1. What are the causes that have resulted in the increased demand for extra-curricular activities?

2. Report upon the objectives, plans, and scope of the Fisher Body Craftsman's Guild.

3. Report upon the League of New Hampshire Arts and Crafts or another league or guild of your selection.

4. How, if at all, should the club sponsor assist in the election of qualified officers?

5. To what extent, and how, should publicity be given to (1) extra-curricular activities; (2) club activities for out-of-school persons?

6. Suggest how to organize a home-workshop club.

7. What are the chief differences between extra-curricular activities and those of guilds such as the Southern Highlands Handicraft Guild?

8. Discuss the advisability of inviting expert craftsmen and leading citizens to give demonstrations or to lead club discussions.

9. Explain how club activities are popularized through auditorium activities.

10. How would you organize and manage a craft demonstration at a county or state fair?

11. Show how guidance is possible through hobbies.

12. Make an annotated list of recent references dealing with extra-curricular activities and report upon them.

13. Prepare a ten- or fifteen-minute talk on: "My favorite hobby and how I would sponsor a club devoted to it."

14. Report upon the Leisure League of America.

15. Investigate and report upon the Future Craftsmen's Association of America.

¹³ Quoted by Charles A. Bennet, *Industrial Education Magazine*, March, 1934.

16. Discuss: "The place of social meetings in the program of extra-curricular clubs."

17. Describe one or more "shop links" that may be of interest to craft club leaders.

18. What suggestions can be offered to the pupil who has no strong hobby interest?

19. Report upon "The Analysis of Skill," by Mildred Fairchild, *Occupations*, 12:40-6, June, 1934.

20. Read *How to Get a Job during a Depression*, by W. C. Graham, Association Press, New York, 1932, and report briefly on the book.

21. Examine *The Home Workshop*, by William W. Klenke, Books 1 and 2, The Manual Arts Press, Peoria, Illinois, 1935, and discuss your findings.

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CHAPTER XXIII

CREATIVE TEACHING

OBJECTIVES, PROBLEMS, AND PROCEDURES

1. Creative expression is essential to happiness. The history of civilization shows that man has always found deep joy and abiding happiness in creating values. The creative impulse has given us the precious folk songs of Stephen Foster, the sweet poetry of Longfellow and Whittier, and Beethoven's immortal symphonies. In similar manner the timeless art of Rembrandt, Titian, Millet, and hosts of others illustrates creative expression. Such names as Shakespeare, Jefferson and Disraeli, Edison and Cecil Rhodes, Horace Mann and Edward Austin Sheldon bring to our minds creative work of a high order.

It is significant that creative expression, in whatever form it may take, is conducive to happiness. Life takes on a deeper meaning when we have labored toward some worthy end. L. P. Jacks is right when, out of long years of reflective thinking, he concludes that the wisest persons he has known are "the men and women whose education *has been grounded in learning to do something excellently.*"¹

Creative work, of whatever kind, portrays our personality and character. Paintings, like Raphael's *Sistine Madonna* and El Greco's *Nativity*, reveal the mood and spirit of the artist; the Taj Mahal, the Parthenon, and the State Capitol at Lincoln, Nebraska, each speaks in unmistakable accents of the vision and the painstaking devotion to great creative effort. Creative teaching is equally worthy and equally satisfying. When we think critically about the extent of the social, economic, and political unrest, and of the insecurity that prevails in large areas of the world today, can there be *any doubt of the need for a sound philosophy of life and of education, and for forward-looking,*

¹ L. P. Jacks, "To Educate the Whole Man," *Adult Education in Action*, pp. 5-6.

creative thinking? Second only to an abiding faith in God, we need well-grounded faith in education as the best and surest way toward a better and happier living.

2. Creative teaching is constructive. For practical purposes education may be classified into two types. The first of these emphasizes the task of passing on to future generations the wisdom of the past. The second stresses the value of meeting the problems of an ever-changing world through original thinking, resourcefulness, and inventiveness. That both types of education have legitimate functions to perform is believed by leaders in education.

Just as good business practice calls into play a knowledge of past experience in the business, so sound education will use those concepts of the past and those social, economic, and spiritual values that have proved their worth through their survival. We are not called upon to choose between the old and the new; it is not a case of one or the other, but we must determine where the major emphasis is to be placed. Creative teaching uses the tried ideas of yesterday, but *more extensively* the mature judgment of today and the evolving ideas of tomorrow.

Creative teaching is active rather than passive. It calls for what Thorndike has termed the "active virtues of citizenship"—self-reliance, initiative, and originality in contrast with obedience, docility, and conformity.²

Education is change, and *creative education is purposeful change*. The faith that we have, and must possess, in order that constructive and cooperative thinking may lead us to goals not yet attained has been put effectively by Suzzallo in the following words: "All that is wrong behind us, and weak around us, discouraging our enthusiasm for the good we see ahead of us, can be mended because we know that men and women can be improved under a correct system and through the education which prepares human nature for it."³

Creative teaching calls for an active, problem-solving attitude toward life rather than one that is passive; it brings into play

²E. L. Thorndike, "Education for Initiative and Originality," *Teachers College Record*, 29.89-100, November, 1937.

³Suzzallo, Henry, *Our Faith in Education*, pp. 106-8.

constructive thinking, planning, and doing in contrast with aimless thought and action.

3. Discriminating thinking is essential. "Can a person," says Boraas, "teach so that he will be remembered 2300 years?" And he then proceeds to answer this question by showing how Socrates did it by helping the youth of his day to formulate their questions and to think through them.⁴ In other words, Socrates taught creatively through guiding others to think for themselves. *The great teachers of all times have stressed self activity. Creative teaching then becomes a procedure in which the emphasis is upon present-day needs, and in which actual habits of work are established by the learners.*

Merely to ask pupils to be original or self-reliant will not develop these qualities. To delegate the major task of education to the teacher will result in dead education, just as delegating religion to the preacher alone will result in a dead church; and delegating politics to politicians alone will bring in its wake a dead democracy. Teaching is creative if it arouses a zeal for learning, if it stimulates selective thinking and purposeful action.

4. Creative teaching emphasizes good habit formation. The more we learn about human nature, the more we realize what powerful forces habits become in our lives. Mental habits and physical habits either aid or hinder us from day to day. Among the valuable habits that creative teaching seeks to develop are: (1) the habit of open-mindedness; (2) the habit of suspending judgment until the facts are known; (3) the habit of looking for causes; and (4) the habit of evaluating on the basis of facts. Each of these will need a word of explanation.

(1) *The habit of open-mindedness.* It would seem self-evident that people should have an open-minded attitude toward life, that they should possess what educators call a "problem-solving attitude" and what scientists term a "scientific attitude of mind." Such an attitude toward unknown problems is one of being willing to accept new interpretations and new view-points when they are based upon facts. But such an attitude is less common than it should be. Tradition, custom, and unwillingness to think critically lead many individuals to oppose truth and to follow blindly

⁴Julius Boraas, *Teaching to Think*.

in the footsteps of unfounded tradition. In industrial arts education many opportunities may be found for developing effective habits of open-mindedness. The person who says a thing cannot be done is soon overtaken by the one who has done it.

(2) *The habit of suspending judgment.* To suspend judgment until the essential facts are known is an art. In this fast-moving world we are all inclined to judge too quickly. The story is told of a stranger who attended an auction sale at which he bid against a cripple who wanted a pair of crutches. The bids were raised until the cripple came to his limit and the crutches were given to the stranger. There were murmurings and boos as the stranger came forward for them. He took the crutches to the cripple and presented them with his compliments—a thing he originally had planned to do. Jeers changed to glances and comments of approval, but those who had not restrained their feelings or suspended their judgment until they were certain of their ground must have felt uncomfortable. Practical arts and vocational education can be very helpful in building up socially valuable habits of reserving judgment until the various angles of a problem have been evaluated. It is said that there are three sides to every question: "your side, my side, and the right side."

(3) *The habit of looking for causes.* Creative thinking penetrates beneath the surface of things; it looks for the underlying causes as well as for the true effects which are not always readily evident. When well-guided, the daily experiences in planning industrial arts work and in carrying it out to a successful conclusion teaches pupils to think with discrimination and to act on the basis of underlying causes. Try-out and exploratory education, based upon the creative or experimental approach, helps to develop analytical thinking. The objective nature of the work enables pupils to see whether or not their thinking was right.

(4) *The habit of evaluating on the basis of facts.* The individual who is truly independent in his thinking by no means discards the ideas of others. He actually makes more use of them than does the less original thinker. But this essential difference must be noted. The creative thinker reads extensively, listens attentively, and makes it a point to know what others have thought and done, but he *evaluates* those ideas and uses such

portions thereof as appear to have value toward achievement, which goes beyond what has yet been accomplished. On the other hand, the servile thinker is satisfied to use less extensive and often less reliable knowledge to guide his action. The rapid changes and development in the field of the industrial pursuits which are well known to everyone call for adaptation, based upon facts. To the extent that industrial arts and vocational industrial education are true to life, pupils will learn to evaluate on a factual basis.

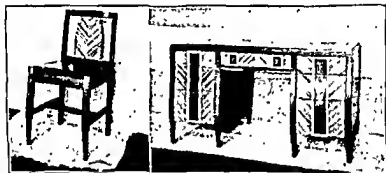


FIG. 54. Examples of creative work produced by Herman Mock, a student at the Pennsylvania State College.

5. Creative teaching is based on well-founded goals. Teaching that stirs others to action has vitality, vigor, and power. In order to have these, it must be the outgrowth of carefully thought-out values that are apparent to the teacher. Creative teaching calls for a thorough understanding of what is to be taught. *It is impossible to teach creatively without a firm conviction that the job is worth doing and worth doing exceptionally well.*

An essential element in truly creative teaching is *enthusiasm*. In order to have enthusiasm one must have a *real interest* in teaching. This implies that the true teacher gets satisfaction out of seeing his pupils develop; that he is willing to be *patient*, *painstaking*, and *thorough* in his work because he feels that the results are worth all it costs.

Such teaching will be effective if the instructor is able to get

the pupils to accept as *their* valid goals those that mature experience and reflective thinking indicate as most promising for the present and near future.

6. **Learning is an individual matter.** Creative teaching proceeds upon the conviction that there are within each person creative impulses which need to be encouraged and nurtured. It is believed that creativeness is something that springs from within and that can be strengthened by understanding and encouragement. Consequently, the recognition of individual differences in learners is very necessary to develop creativeness—to let it bud and flower at its best.

He who would encourage creative learning and original work must be sensitive to individual differences in feeling, spirit, and capacities.

7. **Originality in design.** The creative teacher does not encourage "copy-cat" procedures. He encourages originality in industrial arts design. In the past, America has depended to a considerable extent upon foreign talent in industrial arts design. That should be less necessary in the future, and will be, when we strive for individuality and creativeness as contrasted with the uniformity of mass production.

For the discriminating buyer the hand-made products have a distinctive charm. And as for the personal satisfaction that comes from working out original, as contrasted with standardized or copied designs, there can be no question as to which is the more stimulating and satisfying. Industrial arts projects as commonly made today show entirely too great a leaning toward servile copying. One reason for this is the fact that the majority of industrial arts teachers in service have themselves had most meager instruction in this important aspect of their work. But dark clouds usually have their silver linings. The recent professional literature in industrial education shows that we are conscious of these conditions and progress is being made toward enriching industrial arts and vocational industrial education through closer correlation with the fine arts. In fact, this distinction between the fine and industrial arts is more artificial than real.

8. **The spirit of craftsmanship.** The creative industrial teacher has a fine feeling for the spirit that dominates the activities of

the artist-craftsman. He strives to impart, by example, that feeling of keen enjoyment that means so much to those who work in the spirit of creative craftsmanship. That such work is satisfying far beyond the bounds of commercialized entertainment is too evident to need comment; that it is restful and energizing to many who work in sedentary employment needs no proof.

9. Enrichment through creative thinking. Thinking is a dynamic process. It may be thought of as a flow of consciousness toward an end or goal that is set up by an individual. Learning does not take place without it. But all thinking is not creative. One may think non-critically, loosely, and unscientifically. One's thoughts may have to do largely with the past as compared with the present, and they may proceed but little beyond the bounds that tradition, hearsay, and conscious or unconscious imitation of the opinions or view-points of more virile minds have set for them. On the other hand, thinking may be definitely analytical, logical, and scientifically critical.

In these fast-moving days of social, economic, political, and religious unrest, two of the outstanding needs of the hour are *anti-dogmatic teaching and critical, reflective, evaluative thinking*. No area of education has a monopoly on this. Careful, socially sensitive thinking habits are to be encouraged in all teaching. It may be pointed out, however, with all humility and with a deep sense of the corresponding responsibilities, that industrial arts education—and trade education also—by their nature offer an ideal opportunity to develop such habits of clear and constructive thinking through avenues that are natural, life-like, and effective.

The stimulating effect of labor upon thought and the correlative influence of thought upon motor activity were expressed many years ago by Ruskin, who said: "It is only by labor that thought can be made healthy, and only by thought that labor can be made happy, and the two cannot be separated with impunity."

It is now well known that industrial arts and vocational industrial education stimulate learning. The school shop, with its variety of attractions in the form of learning opportunities, un-

questionably acts as an incentive to effective learning, not only in the shop but also as a "carry-over" into the classroom and into out-of-school life.

10. **Freedom, informality, and naturalness.** Creative learning takes place best where there is an atmosphere of freedom, where the learner feels free to try something that is new, where he is not restrained by outgrown conventions or cramping lock-step requirements.

The more informal and natural the teacher can be, the more likely is he to encourage creative thought and manipulative activity—but always with the reservation that freedom and informality shall not be construed to mean license. Freedom must never be permitted to degenerate into lack of respect for the rights of others in the class, the teacher, or the school. Where there is true freedom there is self-engendered activity—the ideal means of learning.

The freedom and informality that prevail in progressive school shops are clearly conducive to developing the behavior patterns that are needed in a democratically conceived society. Gradually academic education is learning what has long been known in practical arts and vocational education, that freedom, informality, and naturalness are better than regimentation, taboos, and unnatural learning situations.

11. **Working in the spirit of the artist.** "I believe," said Frederick Gordon Bonser, "that the spirit of art lifts the artisan from the plane of the animal laboring to provide itself with creature comforts, to the plane of man working to the end that he may thereby most fully and deeply live the spiritual life of human idealism."³

The true artist, in all realms, is pre-eminently a person who works, and gets his inspiration, through creative effort. Creative teaching seeks to bring out in learners that love for creativeness which has come to mean so much to the teacher's own life and to the life of the artist.

There is no fixed formula for doing this. But the enthusiasm that creative workers possess for their field of special interest is

³Frederick G. Bonser, "My Art Creed," *Life Needs and Education*, pp. XV-XVI, Bureau of Publications, Teachers College, Columbia University, 1932.

the spark plug that releases the power spoken of as "creative impulse." Good teaching techniques are methods that enable the teacher to give in a helpful way the guidance needed.

12. **The place of imagination in creative learning.** All too frequently imagination is thought of as idealistic fantasy that has little relation to the realities of life. Imagination at play may be fanciful, but not so with imagination at work. Men and women in all walks of life have become great by putting their imagination to work. When what seemed like insurmountable problems arose, they used their powers of imagination, buttressed and strengthened by such facts as could be made available, to devise new methods and procedures.

Well-grounded, seriously oriented imagination is at the heart of creative work. If that be true, the implications for creative teaching are obvious: Strive to bring out and strengthen in every way the kinds of imagination that make for improvement, refinement, and betterment as distinguished from satisfaction with present ways and standards. This is done by showing interest in creative thought and work, by recognizing the spirit that prompted the activity, and by guiding learners so that they will strive persistently to develop their latent capacities.

Creative or productive imagination frees us from the commonplace. It enables us to weave old experiences into new patterns of thought and of behavior.

13. **The place of will and courage.** In this age, so vibrant with change, so complex in its trends, and so challenging in its unsolved problems, there is urgent need for creative thinking and creative achievement. Thinking and doing should go together. Unless we develop thinking men of action who can think their way through complex problems and then act upon them, civilization is threatened with disaster.

But creative effort, of whatever kind, takes will-power and courage. The man who dares to say what he believes, in a different way from the way it has been said before, must stand the ridicule of lesser minds, just as Louis Pasteur was made sport of by his contemporaries. *The teacher who teaches in the creative spirit may be misunderstood by those who believe that conventional techniques are better.*

The value of developing courage in learners is evident. Many a person with very ordinary talents, but with strong will and courage, has done far more for the betterment of society than others with brilliance and skill who were dominated by vacillation and lack of driving power. Creative teaching calls for a bold spirit and for gallant courage.

14. Creative work not always fundamentally different. It would be wrong to assume that creative work refers only to that which is distinctly different from other work. Creative shopwork can be work that gives a new touch or tone to something that is quite "standard." There is opportunity for creativeness in all forms of industrial education. Common tools like hammers and saws have been improved, centuries after they were invented. Common materials are used in new combinations. Common objects are given a different form. All this represents creative work. The opportunities to work creatively are numerous.

Very ordinary work like cobbling a pair of shoes, digging a ditch, sweeping a floor, and storing supplies can be done in the creative spirit. Even very simple tasks can be done excellently and with a touch of originality. One of the purposes of creative teaching is to lead persons to see the possibilities for doing what they would do anyway, in the creative spirit. Each task then becomes a stimulating challenge as to how it might be done better or with less cost or effort.

15. Creativeness and sense-perception. Whatever is created is brought into being through sense-perception. It is through teaching learners to perceive more accurately that the ability to improve upon the old is developed. Sense-perception is often developed to a high degree through manipulative work. A good way to see how a tool works is to try it out—to get the "feel" of it as well as to see what it does. Better methods of work are developed through reflective thinking about such methods, followed by experimentation.

The accuracy of sense-perception can be improved through guided experience. The trained sense of touch can sometimes distinguish what the eye cannot see, and conversely, visual acuity may perceive what the sense of touch fails to register. Creative

learning calls for coordinated sense-perceptions. These perceptions, made at various times and in sundry places, may be combined later into new combinations.

A cedar chest may have copper ornamentation somewhat like that of an old treasure chest, a general design that is not uncommon, inlay that is distinctive, and carving that bespeaks original-



FIG. 55. A study in coordination as recorded by the photographic division of the Department of Visual Education, Detroit Public Schools.

ity. In its entirety the chest is quite original and a credit to the boy who made it.

16. Imitation thwarts creativeness. Many things can be learned to advantage through imitation. Manipulative skills can be acquired to advantage by that means. Many habits, good and bad, are learned that way. But imitation remains the arch enemy of creativeness. Imitation makes us slaves to conventional ways of doing things. These, to be sure, have their appropriate place but they must not replace originality.

Imitation, if it goes no farther, makes for a static civilization rather than for an evolving one. It holds us to lower standards than can be obtained through more original means.

We are so in the habit of seeing things made alike through mass production that we have almost lost the ability to appreciate that which varies from the common. The recent trend toward a revival of the hand crafts will no doubt help to teach us the superb values of original design and creative workmanship. The Navajo rug is made of coarse, home-spun wool but it has *quality*. The old iron hinges on the barn built a century ago still speak eloquently of the handicraft of the smith who fashioned them. The old stone cottages of early settlers have become softened by age so that they are more attractive than before.

17. *Thinking and doing as others.* In our emphasis upon creativeness let it not be overlooked that there are significant values in what has become traditional. A thing is not right merely because it is old, or because it is new. Some things are old because their values have been proved over a period of years or generations. We have, for example, the tradition of unselfishness which has been exemplified so beautifully times immemorial. Then there is the tradition of wholesome family life as developed and passed on to us by the Jewish patriarchs. Another example is the traditional service of the Red Cross. These are but three examples, selected at random, to show that many things that are traditional must not be cast aside.

But that is only half the picture. The purpose of creative education is to make it possible for people to become creators of values that are better and higher than those that today prevail.

18. *The clash between the younger and older.* One of the outstanding problems of the present is how best to bring about the modifications that need to be made through education. The younger group holds that education must change faster than society changes, or else education cannot take the lead that it must have.

The older group counters that we should "strive to evolve those constants that make life livable, understanding of life, tolerance, unwillingness to accept slogans and taboos without

critical judgment—in a word those attitudes which are associated with intellectual alertness and intellectual integrity.”⁶

The younger group is inclined to blame our present program of education for the defects of society. The older one maintains that inordinate lust for power at any cost, racial misunderstandings, old antagonisms, and wrong leadership are largely responsible for our present difficulties.

Creative teaching, to the older group at least, does not consist in casting overboard all that is old in order to sample that which is untried. They base their faith in a philosophy of life and of education similar to John Dewey's “self-repairing” philosophy, in accordance with which we cling to that which is of proved worth and repair the imperfections as we go.

19. *Peddlers or prophets?* The question that he who tries to teach creatively must ask himself is the one Glenn Frank referred to in his well-known prayer for teachers, one paragraph of which reads: “We have been peddlers of petty accuracies when we should have been priests and prophets of abundant living.”

Teachers of industrial arts and vocational industrial education, along with all others, should face that issue. To what extent are we peddlers of petty accuracies, and to what extent do we exert our influence for those things that count most? Practical arts and vocational education rightly concern themselves with teaching “accuracies”—but are they essential or are they of little value? Are they the major aim or are there other major goals?

20. *What to strive for in creative teaching.* Among the outcomes sought through creative teaching are:

(1) *Creative attitude.* The attitude of mind that is sensitive to the possibilities of change is the creative attitude. It is the spirit that is on the alert to seek new methods of approach and better ways of doing things. Back of the creative attitude is the purpose to work toward goals not yet reached and standards not yet attained. “Only purpose,” says McCall, “begets purpose. . . . Only purpose makes purpose permanent. . . . Purposes are not made permanent by exercise.”⁷ The creative spirit purposes to express itself constructively.

⁶ Paul Klapper, “A Challenge to Contemporary Education,” *School and Society*, 42:392-5, September, 1935.

⁷ William A. McCall, “My Philosophy of Life and Education,” *Teachers College Record*, April, 1934, January, February, and October, 1935.

(2) *Creative thought.* Creative learning and teaching get inspiration through creative thinking as contrasted with non-creative or non-critical acceptance of what others think. We must be able to think independently.

(3) *Creative doing.* Creative teaching seeks to stimulate in each individual, and to strengthen in him, the God-given inner urge to express himself creatively.

(4) *Enjoyment through creation.* Creative teaching seeks to foster and to strengthen in learners the driving power of satisfaction and enjoyment that is the natural outgrowth of accomplishment.

(5) *Adaptability.* It is believed that creative learning helps to make persons adaptable to changing requirements.

(6) *Resourcefulness.* Creative teaching seeks to impart the resourcefulness that is needed in a complex and fast-changing world.

(7) *Confidence and faith.* Creative learning is a means of attaining that confidence in self, in others, and in the ultimate achievement of what is best and most worth-while.

21. Self-development in creativeness. "Only a small proportion," says Counts, "of those who are preparing definitely to teach art, music, dramatics, and the like, actually participate in creative work in those arts. The activities of most of such prospective 'art' teachers is sheer imitation, representation. It is mastery of knowledge of the art and not creative self-expression in it and through it."⁸

What has just been quoted about teachers of art and music can be duplicated for teachers of industrial arts. In the latter field, as well as in the former, there is need for *creative ability of a high order* on the part of teachers.

In certifying teachers of industrial arts the emphasis, in some quarters, has been upon the college degree to the extent that the highest types of craftsmen have been refused certification unless they could meet the same academic standard as other teachers. High professional standards are desirable but they will not replace outstanding creative ability in the fine or practical arts.

Self-development through creative work is a goal that is open

⁸G. S. Counts, *American Road to Culture*, New York, John Day Co., 1930, pp. 389-90. (Used by special permission of the publisher.)

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18. Why is creative learning inspirational?

19. Discuss: "The way to get people to love beauty is to give them the opportunity to create it." Bring out the analogy with respect to industrial education

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CHAPTER XXIV

INTEGRATION

ITS MEANING AND IMPLICATIONS

1. What "integration" means. During recent years the word integration has appeared with increasing frequency in educational literature, discussions, and conferences. To some the word is a key-word or a slogan that is synonymous with "correlation." Others think of integration as the equivalent of "fusion," and there are other interpretations.

Contrary to popular opinion, the word is by no means a new one to the science of education. Charles W. Knudsen has called attention to the fact that Herbert Spencer used the term in 1855, and that William James employed it in 1890.¹

To think of integration merely as a popular phrase meaning the same as correlation is unfortunate. The concept of correlation has put the major emphasis, as we see it, upon the wrong thing, namely subject matter. Correlation has meant: to bring aspects of one or more subjects to bear upon those of other subjects. Thus, correlation in related subjects has consisted of showing how shopwork ties in with history, geography, and art. In some instances correlation has meant even less. As W. D. Reeve has said, "In attempting to correlate content material, subject matter teachers, and particularly administrators, have made the mistake of trying to correlate by merely changing names of courses, calling algebra and geometry 'correlated mathematics,' history and geography 'social studies,' and the like."

This is also true of some so-called courses in "related subjects" taught on a vocational basis. Conventional, unrelated mathemat-

¹Charles W. Knudsen, "What Do Educators Mean by Integration?" *Harvard Educational Review*, 7 15-26, January, 1937

²W. D. Reeve, "Mathematics and the Integrated Program in Secondary Schools," *The Mathematics Teacher*, 30:155-60, April, 1937.

ics, science, and drawing have masqueraded as related subjects. The correlation between the theory and the shopwork has, in some instances, been notable for its absence.

"Integration," as a psychological concept, places the major emphasis, not upon subject matter but upon the individual as the integrative agent. The physiologist, neurologist, and psychologist believe that there are several integrative agencies within the individual. One of these is the nervous system, which is largely responsible for integrating man.

Psychologists interested in abnormal behavior use the term to designate a person's adjustment to his environment, and as contrasted with "disintegration."³

In view of the current interest in recognizing the individual, rather than subject matter, as the point of major emphasis, we need a term other than "correlation" and "fusion." The word "integration," used in the psychological and educational sense, appears to serve that purpose. In this sense correlation refers to the development and rounding out of personality. It is concerned directly with developing persons who will respond properly to the complex environment of today.

"The term 'integration,'" says Lester Dix, "does not denote to the staff of Lincoln School just another educational slogan. To them it constitutes a direct answer to the profound and widespread disintegration that now exists in all areas of human experience." He adds: "No education attempting the integration of youth in modern society can escape this fundamental and threatening disunity."⁴

2. *Integration defined.* Integration, then, springs from the imperative need of overcoming the disrupting and disintegrating influences springing from a complex, high-pressure, fast-changing environment. To accomplish this there must be at least three aspects of integration: (1) the integration of personality, (2) the integration of experience, (3) the integration of the curricu-

³Charles W. Knudsen, *op. cit.*, p. 18. (Used by special permission of the publisher.) See also, L. Thomas Hopkins, *Integration, Its Meaning and Application*, New York, D. Appleton-Century Co., 1937, Chapter VI, "The Psychological Evidence for Integration."

⁴Lester Dix, "Integration in the Lincoln School Philosophy," *Teachers College Record*, 37:363-71, February, 1936.

lum. The pivotal center of all this is the *individual*; subject matter is secondary.

"Integration," says R. D. Case, "is the developing and rounding out of the whole personality of the child. It connotes bringing out to the maximum every talent with which the child is endowed, and the development of every phase of his life in preparation for the future."⁵

Keeping in mind, then, the objectives set forth, we may say: *Integration, as an educative process, consists in bringing out the unity and relatedness in the complex elements of life experiences to the end that the learner shall be able to respond to his environment courageously, creatively, and effectively.*

L. Thomas Hopkins thinks of integration as being both a process and a goal: "Integration, then, is a process of continuous conscious control over the interactions of the individual and his environment, to the end that he may become integrated within himself and with the world in which he lives."⁶

In his book, *Integration, Its Meaning and Application*, is found the following definition: "*Integration is a shorthand word used to designate intelligent behavior. Integrating refers to continuous, intelligent, interactive adjustment.*"⁷

Correlation refers largely to unifying subject matter. Fusion involves only partial unification of related elements of problems. Integration puts the emphasis upon producing unitary, coordinated, adaptive, and creative individuals. The focal points in integration is upon what goes on *within* the learner. Integration represents the individual's ability to see through, and make use of, relationships.

3. The need for integration. "The most casual examination of our secondary schools," writes Jesse H. Newlon, "will convince anyone that mechanization of learning, a lack of integration of its educational processes is one of its salient characteristics. Our administration of teaching makes for artificial, disconnected, in-

⁵R. D. Case, "The Platoon School Integrates," *The School Executive*, 56 385+, June, 1937.

⁶L. Thomas Hopkins, "Integration in the Senior High School," *Teachers College Record*, 37.408, February, 1936.

⁷L. Thomas Hopkins, *Integration, Its Meaning and Application*, New York, D. Appleton-Century Co., 1937.

- (1) General education must be made more vital.
- (2) Integration must help to bring unity out of what would otherwise be unrelatedness.
- (3) Teaching practices must fall in line with accepted principles of education.⁹

From the social point of view it is readily conceded that each individual should learn how to make the most of his capacities in order that he may contribute significantly to the betterment of life. It is also obvious that he needs to learn how to live and to work harmoniously and cooperatively with others. The ability to earn one's living is not the least of the requirements for making a good citizen. Integration is essential to personal happiness, to social adjustment, and to economic stability.

4. Plans for integration. Numerous proposals have been made relating to how integration can best be brought about. One of these plans is to use one subject or activity, such as social studies, art or industrial arts, as a center and correlate all other learning with the core subject. The advocates of this plan appear to think of integration largely as bringing out the co-relationships of subject matter.

Another plan is to have the learner select an activity or unit of learning, and to have him go from teacher to teacher—from classrooms to shops, or vice versa, in search of assistance. There are several obvious difficulties with this plan, not the least of which are that the learner may waste a good deal of time at it and the sponsor may find it necessary to substitute assignments for pupil selections, thereby altering the plan rather fundamentally.

A third plan consists in retaining the usual subject-matter divisions found in the secondary school but providing for as much unification of learning as possible by having each teacher, each week, write out in brief form an outline of the major ground to be covered during the coming week. These notations are circulated from teacher to teacher. In so far as it is feasible to do so, every instructor makes it his business to "tie-in" his own instruction with that of the other teachers in the school. Each

teacher tries to show the inter-relationships of what he teaches and other areas of learning. This, it is felt, makes for the simplification and unification of learning and is likely to bring about better integrated individuals.

A fourth plan consists in working for integration through curriculums in which aims are suggested in terms of desired pupil behavior without regard to any subject field. This plan can be illustrated by the Virginia curriculum.

5. The Virginia curriculum and integration. The program of curriculum revision, started in Virginia in 1931, has a two-fold objective: to improve the teachers in service and to suggest curriculums and courses that will serve the needs of all learners enrolled. The curriculums, which have had the benefit of much study and discussion, are to "involve an integration of all subjects in the elementary school and the fields of English, social studies, science, and mathematics in the high school as far as it seems wise."¹⁹

This integrated program has provision for developing aims suggested in terms of desired pupil behavior and goals that are broader than, and not dependent upon, the subject areas.

Teaching material is organized, in all grades from the first through the twelfth, under the following eleven major functions:

- (1) Protection and conservation of life, property, and natural resources.
- (2) Production of goods and services, and distribution of the returns of production.
- (3) Consumption of goods and services.
- (4) Communication and transportation of goods and people.
- (5) Recreation.
- (6) Expression of aesthetic impulses.
- (7) Expression of religious impulses.
- (8) Education.
- (9) Extension of freedom.
- (10) Exploration.
- (11) Integration of the individual.

The courses of study suggested are voluntary. It is rather difficult to evaluate the results secured to date. New tests must be

¹⁹J. Paul Leonard, "Is the Virginia Curriculum Working?" *Harvard Educational Review*, 7:66-71, January, 1937. (Used by special permission of the publisher.)

produced to measure growth in attitudes, appreciations, and understandings.

6. **Integration through industrial arts.** "Learn through doing" is a short and effective way of saying that *manipulative work integrates*. In looking for ways and means of developing in individuals "continuous intelligent, interactive adjustment," let us not overlook one of the most effective means—industrial arts.

Discriminating thinking is an essential ingredient of the integrated personality. Industrial arts experiences are rich in thought-provoking situations. *Creative expression* is another necessary element. It is quite necessary to indicate the opportunities for creative expression that come through working in the industrial arts.

Another factor in integration is *cooperative interacting*. Where may one find a setting that is more natural and conducive to developing attitudes and habits of mutual helpfulness and cooperation than through the industrial arts activities?

The typical industrial arts shop, guided by an integration-conscious teacher, is first and foremost a little democratic community in which *self-government*, *self-adjustment*, and *self-development* are recognized as important goals.

Integration comes through *adjustment* to life situations. Industrial arts education is definitely and largely concerned with providing such adjustment through representative try-out and exploratory experiences. It furthermore seeks to adjust to life needs by stressing *appreciational understandings*. Participation in industrial arts is integrative in that it makes intelligent, appreciative consumers. It gives insights into many broad areas of human endeavor and helps persons to understand much of contemporary life.

Purposing, planning, doing, and evaluating are everyday experiences in industrial arts. That they are integrative is a commonplace.

7. **Integration through vocational education.** The recent trend in progressive education is to make education meet the functional needs of individuals. *Vocational education is definitely functional*. It prepares for more effective occupational life. To say that this

is utilitarian is begging the question. Economic security has become a much-to-be-desired thing for most people.

Vocational education has its tap roots deep in the soil called "life-needs." It seeks to prepare individuals for, and to keep them in effective adjustment to, constantly changing occupational requirements. This, too, is integrative experiencing.

If it be true that meanings, values, and insights are best developed through social and economic reality, then vocational education must be rich in elements that make for integration. If education should concentrate upon the improvement of living, then vocational education, which lies at the foundation of art and culture and is directly concerned with preparation for living, has socially valuable contributions to make.

8. *Life-centered instruction.* Instruction that springs from vital, present-day life situations is essential to integration. Industrial arts education, which aims to give an appreciative understanding of contemporary life through a study of representative tools, materials, processes, and life habits of people concerned with doing the world's work in productive industries and manufacture, is rich in life-centered learning opportunities. Vocational industrial education is likewise largely concerned with enabling individuals to sample true-to-life-experiences in order to make the transition from school to work an easy one, and in order to prepare, in so far as that is possible, for what adult life demands of workers in trade or industrial pursuits.

Practical arts and vocational education are leading the way in bringing and keeping instruction in mesh with the life requirements of today and with the trends of tomorrow.

9. *Integration through creativeness.* Creativeness is not only a satisfying means of self-expression but it is also an effective procedure in developing the well-integrated person. The satisfactions that come through working in the creative spirit help to overcome the tensions of modern life. They help to produce normality and to counteract maladjustments. Creative thinking and work of the manipulative sort give to individuals a constructive outlook and a courageous attitude toward new and unsolved problems.

Success in creative work carried out under school auspices develops self-confidence in ability to do constructive work—especially work that has some common elements. Creative work in the realm of the practical arts and vocational education is a stepping stone to larger and more difficult creative undertakings in later years, and it is furthermore an important step in the development of what our complex age demands—integrated people.

The various methods and devices that the teacher can use to guide and further the creative impulses of learners, young and older, are truly contributions toward furthering integration.

10. **Integration through community contacts.** Coordinating and correlating community needs with the school program is not integration, but it makes for integration. Among the ways that are used in bringing teaching and community requirements together are:

(1) *Coordination.* The coordinator is responsible for making direct contact with industry for the express purpose of developing closer cooperation between the industries and schools. It is his job to study the educational needs of industry and to acquaint school authorities with his findings. Conversely, it is also his job to know what the schools are doing and what they are prepared to undertake in the way of service to industry.

The coordinator's job varies according to local requirements. He may for a time give major attention to advising, placing, and following up graduates and adults who are unemployed or about to become so. Again, he may devote much time to helping industries organize apprenticeship and other training programs. Other responsibilities may be to launch studies or surveys that are undertaken to reveal the need for vocational education in a school district or in a larger area.

Coordinators may be employed on a regional basis (comprising several states), on a state basis, or for smaller units of educational administration. They may be full-time men or women, or the work may be on a part-time basis. Coordinating is done on a part-time basis by supervisors, directors, and teachers. In some cases special provision is made in the way of time allot-

ment for the work; in other instances it is done during hours when school is not in session.

The coordinator is in a strategic position to make suggestions as to how instruction can be made to serve community needs.



FIG. 58. Much creative effort is represented by this battery of linotype machines, and it requires a well-integrated personality to measure up to the standards demanded of operators in the modern composing room.

His work, then, is integrative for it enables learners to make intelligent adjustments to community conditions.

(2) *Advisory service.* The helpful services that can be rendered to the schools through well-selected representative advisory committees are too well known to need detailed description. In some states such committees must be appointed in order that

state and federal aid may be secured for vocational education. In others the appointment is optional but often recommended.

For purposes of vocational industrial education, separate advisory committees are usually appointed for each major branch of instruction. The help given by such committees includes: (1) to suggest competent instructors, (2) to assist in determining teaching content, (3) to keep the schools informed about recent trade developments, (4) to make recommendations concerning materials, tools, machines, and processes, and (5) to interpret the schools to industry and to the community. Trade advisory committees help to keep instruction up-to-date and purposeful.

(3) *Practical work.* Work that is practical in the sense that it meets actual needs is an integrative experience. Well-selected projects in industrial arts and suitable jobs in trade education are absolutely essential in preparing well-integrated men and women.

School instruction is non-integrative to the extent that the work done is artificial and non-functioning. Other things being equal, the kinds of work for which one can readily see evident need in the present life of the learner or in adult life are more integrative than those of doubtful application.

"Practical" work is not necessarily identical with production jobs. The latter are frequently very practical, but not necessarily so. A number of factors must be considered in determining what is "practical"—either for industrial arts or for vocational education. Vocational education is given in order that individuals may develop through learning. Those kinds of manipulative experiences that are best suited to stimulate functioning learning are best. In vocational education production jobs are usually, but not always, better than non-productive work.

(4) *Guidance.* A school service that is of distinct value in the development of integrated men and women is guidance. By this is meant guidance in the broad sense of the word. The right kinds of counseling, placement, and follow-up service are pre-eminently integrative. The guidance that every good teacher exerts indirectly and directly helps the students to make the internal adjustments that must be made if integration is to be the outcome.

The influences of home and the whole environment are potent factors that either help or hinder integration.

11. Integration through visual-sensory aids. Well-selected visual-sensory aids are known to be effective in deepening insights, in broadening outlooks, and in bringing out inter-relationships. When one considers their variety and extent, in and out of school, in work and in play, one readily sees that such aids hold a high place in learning. And, since one of the purposes of learning is to produce well-integrated individuals, the relationship of visual and sensory aids to integration is readily discernible. The visual and sensory aids serve as a shorthand route to integration.

12. Integration through freedom of inquiry. The relatively recent spread of systematic public discussion through open forums, symposiums, panel techniques, and round-table conferences has resulted, in part, in the fact that we are learning to appreciate that progress can best be made in controversial issues through discussion. An *exchange* of view-points is what leads to refined ideas and to progress.

But real progress can take place only where there is *freedom* of inquiry and freedom of discussion. We must recognize that real freedom of inquiry, of oral, and of written expression is most vital to the task of adjusting individuals to effective, democratically conceived living. This is but another way of saying that freedom of inquiry is basic to integration.

13. Misinterpreting integration. Integration is not a matter of subject-matter boundaries. It may, or may not, be advisable to eliminate the groupings commonly observed in areas of learning. Integration is more fundamental than the classification of subject matter. Carleton W. Washburne, the able superintendent of schools, Winnetka, Illinois, who is known for his progressiveness, sounds a word of warning against misguided concepts of integration. After mentioning the desirable effects that have come from curriculum changes that have included the breaking up of "water-tight compartments, unrelated to the others and to the child's life," which led to such reactions as the "project method" and "integration," he adds: "Like most reactions, this one has swung to the opposite extreme. . . . A complete interrelation of

all things a child studies is unimportant and unnecessary. Life itself is full of separate, unrelated activities."¹¹

Here and there so-called programs of integration have broken down. In some instances absurd things have been done in the name of integration. But this does not prove that the concept represented by the word "integration" is without merit.

14. Guide-posts in judging integration. It may be of interest to consider instruction that is thought to be integrative in the light of such questions as these:

- (1) To what extent does the work call forth whole-hearted interest?
- (2) To what extent is the work done in a creative spirit?
- (3) How completely does the teaching content represent current life needs?
- (4) Is the major emphasis on learner growth or on mastery of knowledges and skills?
- (5) To what extent does the instructor succeed in developing an atmosphere that reflects the American ideal of democratic interaction and group cooperativeness?
- (6) To what extent is the instructor successful in bringing out essential inter-relationships and in getting pupils to see the unity that exists between many apparently unrelated elements of learning?
- (7) To what extent does the instruction prepare for, or contribute toward, the goals that were proposed by a Committee of the National Education Association as suitable socio-economic goals of education?¹²
- (8) To what extent does the instruction make for harmonious adjustment to an ever-changing environment?
- (9) To what extent does the instruction serve guidance, try-out, and exploratory purposes?
- (10) To what extent does the instruction prepare for effective work and for creative living?

PRACTICAL SUGGESTIONS FOR TEACHING

And now, in the light of what has been written, let us list some points that may be suggestive for integrative teaching.

1. Life is so complex and knowledge so vast that confusions are inevitable unless we look for, and find, inter-relationships.

¹¹Carlton W. Washburne, "A Sane View of Integration," *Industrial Education Magazine*, 32 125-6, September, 1937.

¹²See Chapter I for a statement of these goals.

2. Integrative teaching will bring out such fundamental interdependencies as those between the hewers of wood and the carriers of water, on the one hand, and white-collar workers on the other.

3. Creative work is integrative—especially so when it involves learning through doing.

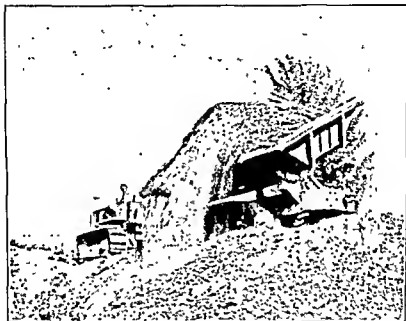


FIG. 59. A "Caterpillar" Diesel Seventy-Five is being used to remove the top layer of slate and soil so that the underlying coal can be mined to advantage. Good judgment, skill, and coordination of mind and body are required for such work.

4. Purposeful self-directed activity is more satisfying than regimented learning.

5. Pupil and teacher relationships in the practical arts and vocational education are, or should be, peculiarly informal, democratic, and integrative.

6. Integrative teaching calls for clear objectives, practical subject matter, sound methods, and critical or discriminating thinking.

7. It is probable that few, if any, areas of learning have more

helpful contributions to make to integrative learning than are made through practical arts and vocational education which have their tap roots in the soil called "life needs."

FOR DISCUSSION

1. Distinguish between correlation and integration.
2. What evidence may be cited to show that "integration" is variously interpreted?
3. State your interpretation of what is meant by "integration."
4. Explain how industrial arts integrates.
5. Show how vocational education contributes to integration.
6. Discuss the psychological evidence that Goodwin Watson gives concerning integration.¹²
7. Discuss: "Integration is not essentially an achievement which has been learned."
8. May experience modify or extend integration? Explain.
9. How may integrative activity offset or retard disintegrative influences?
10. Mention several factors or influences that further or produce disintegration.
11. Evaluate the contributions of the correlated curriculum toward integration.¹³
12. Discuss Carleton Washburne's view of integration.
13. Report upon "Arguments Favoring Integration." (See Supplemental Reading List which follows.)
14. Indicate how integration may be extended in your field of major interest.
15. How is integrative teaching a significant forward step in education?

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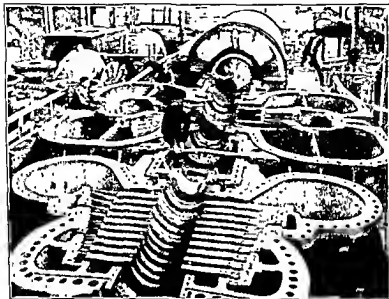


FIG. 60. Showing the need for integrated learning. A view of an apprentice and skilled craftsmen working on a 105,000-kilowatt turbo-generator set in one of the shops of the General Electric Company.

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APPENDIX

A SUGGESTIVE LIST OF PROFESSIONAL PERIODICALS FOR TEACHERS OF PRACTICAL ARTS AND VOCATIONAL EDUCATION

- American Journal of Sociology*, The University of Chicago Press, 5750 Ellis Ave., Chicago, Ill.
- American School Board Journal*, Bruce Publishing Company, 524-544 Milwaukee Street, Milwaukee, Wis.
- American Vocational Association News*, American Vocational Association, Studio Press, Inc., Indianapolis, Ind.
- Clearing House*, 207 Fourth Avenue, New York, N. Y.
- Education*, The Palmer Company, 120 Boylston St., Boston, Mass.
- Education Digest*, Post Office Box 100, Ann Arbor, Mich.
- Educational Abstracts*, 230 Fifth Ave., New York, N. Y.
- Educational Administration and Supervision*, Warwick and York, Inc., Baltimore, Md.
- Educational Method*, 1201 Sixteenth St., N.W., Washington, D. C.
- Educational Record*, American Council on Education, 744 Jackson Place, N.W., Washington, D. C.
- Educational Research Bulletin*, College of Education, The Ohio State University, Columbus, Ohio.
- Educational Screen*, The Educational Screen, Inc., 64 E. Lake St., Chicago, Ill.
- Elementary School Journal*, The University of Chicago Press, Chicago, Ill.
- Hygieia*, The American Medical Association, 535 N. Dearborn St., Chicago, Ill.
- Industrial Arts and Vocational Education*, The Bruce Publishing Company, Milwaukee, Wis.
- Industrial Education Magazine*, The Manual Arts Press, Peoria, Ill.
- Journal of Adult Education*, The American Association for Adult Education, 60 E. 42nd St., New York, N. Y.
- Journal of Business Education*, 512 Brook Bldg., Wilkes-Barre, Pa.
- Journal of Education*, New England Publishing Company, 6 Park Street, Boston, Mass.
- Journal of Educational Psychology*, Warwick and York, Inc., Baltimore, Md.
- Journal of Educational Research*, Public School Publishing Company, Bloomington, Ill.
- Journal of Educational Sociology*, The Journal of Educational Sociology, Inc., 26 Washington Place, New York, N. Y.
- Journal of Experimental Education*, Democrat Printing Co., Madison, Wis.
- Journal of Home Economics*, American Home Economics Association, 620 Mills Building, Washington, D. C.

- Journal of the National Education Association*, National Education Association, 1201 Sixteenth St., N.W., Washington, D. C.
- Labor and Industry*, State Department of Labor and Industry, South Office Building, Harrisburg, Pa.
- Mathematics Teacher*, The Mathematics Teacher, 525 W. 120th St., New York, N. Y.
- Nation's Schools*, The Nation's Schools Publishing Company, 919 N. Michigan Ave., Chicago, Ill.
- New York State Education*, The New York State Teachers Association, 100 Liberty St., Utica, N. Y.
- Occupational Index*, National Occupational Conference, 551 Fifth Ave., New York, N. Y.
- Occupations*, The Vocational Guidance Magazine, 551 Fifth Ave., New York, N. Y.
- Pennsylvania Agricultural Education*, Department of Rural Education, The Pennsylvania State College, State College, Pa.
- Pennsylvania School Journal*, Pennsylvania State Education Association, 400 N. Third St., Harrisburg, Pa.
- Pittsburgh Schools*, The Board of Education, Pittsburgh, Pa.
- Practical Home Economics*, The Lakeside Publishing Company, 468 Fourth Ave., New York, N. Y.
- Progressive Education*, Progressive Education Association, 310 W. 90th St., New York, N. Y.
- Research Bulletin of the National Education Association*, National Education Association, Washington, D. C.
- School and Society*, The Science Press, Lancaster, Pa.
- School Executive*, 1126 Q Street, Lincoln, Nebr.
- School Life*, United States Department of Interior, Office of Education, Washington, D. C.
- School Management*, School Management, Inc., 9 E. 40th St., New York, N. Y.
- School Review*, The Department of Education, University of Chicago, Chicago, Ill.
- Science Education*, Science Education, Inc., 525 W. 120th St., New York, N. Y.
- Social Frontier*, 41 W. 90th St., New York, N. Y.
- Social Studies*, 1021 Filbert St., Philadelphia, Pa.
- Teachers College Record*, Bureau of Publications, Teachers College, Columbia University, New York, N. Y.
- Vocational Education News*, Pennsylvania Vocational Association, Publication Office; Pennsylvania Soldiers' Orphans School, Scotland, Pa.

For a complete list of education periodicals write for the Yearbook of the Educational Press Association of America, 1201 Sixteenth Street, N.W., Washington, D. C. (free).

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